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ABSTRACT

A study determined whether a pattern of continuing failure in reading for three remedial second graders could be changed and the students brought to grade level as measured by the Ginn Reading Program, when taught with brain compatible techniques (including active learning, cooperative learning, feedback, individual instruction, and risk taking). Results indicated that the use of brain compatible techniques in conjunction with the Ginn Reading Program was effective for the three students. Findings suggest that the use of brain compatible techniques strengthened the dispositions of interest, effort, and mastery toward reading for the three students. (Contains 48 references and 13 figures of data.) (Author/RS)

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ED 410 525

Reading Remediation

Through the Use of Brain Compatible Instruction

by

Sister Mary Ann Jacobs, SCC

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ABSTRACT

This study was undertaken to determine whether a pattern of continuing failure in reading for three remedial second graders could be changed and the students brought to grade level as measured by The Ginn Reading Program (1985), when taught with brain compatible techniques.

The study revealed that the use of brain compatible techniques in conjunction with The Ginn Reading Program (1985), was effective for the three students involved in this study. The study indicated that the use of brain compatible techniques strengthed the dispositions of interest, effort, and mastery toward reading in the three members of the remedial group.

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CHAPTER ONE

Introduction

Background and Significance of the Problem

Recent research indicates that the level of reading proficiency attained in the United States is significantly lower than in other industrial nations. R. L. Thorndike's study (cited by Anderson, Heibert, Scott, and Wilkinson, 1985, p. 3) completed over a decade ago, compared reading performance in 15 countries. American students were never in first or second place on any of the tests and on most of the tests they ranked at or below the international range.

The problem facing education today is how to bring about learning. "There is reason to be optimistic about the potential for the improvement of literacy in this country....the last decade has witnessed unprecedented advances in knowledge about the basic processes involved in reading, teaching, and learning. The knowledge is now available to make worthwhile improvements in reading throughout the United States." (Anderson, Heibert, Scott, and Wilkinson, 1985).

Educators are challenged to find methods that will produce learning. Leslie Hart, in his Preface to Human Brain and Human Learning (1983), suggests that educators need to recognize the brain as the organ for learning. If learning is to improve, instruction and environment must fit the nature and structure of the brain.

At a small rural elementary school, it was observed that seatwork was a major component of the reading program. First, second, and third graders were spending as much as 90 minutes a day completing worksheets and workbook pages.

In this small school of 220 students, it was further observed that at every grade level, there was one reading group that was six to twelve months below grade level according to the Ginn basal reader series in use. Discussion with teachers disclosed that once a child was below grade level in reading, it was possible that the child remained below grade level throughout the eight years in elementary school. It was conjectured that the student was never able to reach grade level because of the numerous exercises that needed to be completed before moving to the next level.

Upon further review of mid-term examinations, it was noted that three second graders failed the first semester cumulative examination in Language Arts. Given the scores of the 17 other students in the class, these three second graders were considered sufficently below grade level to warrant remediation in reading. Upon further investigation of their reading achievement, it was noted that the first semester cumulative Language Arts examination included testing of skills from the second grade reading book, an assessment of skills which these three students obviously lacked. If these three students who were identified as

below grade level in reading as measured by The Ginn Reading Program (1985), could reach grade level achievement by the end of second grade if they were taught with brain compatible techniques, then this would provide information useful to all teachers of students with remedial needs.

Therefore, beginning in February, a process of remediation was begun through reading instruction using brain compatible techniques with these three students to determine whether the pattern of failure could be changed and these students be brought to grade level by the end of second grade.

Because of the ample opportunities for observing the students on a daily basis, the case study method was used as the means of research for this study, since the case study is potentially the most valuable method known for obtaining a true and comprehensive picture of individuality (Barr, Davis, and Johnson, 1953).

General Statement of the Problem

This study was undertaken to determine whether a pattern of continuing failure in reading for three remedial students could be changed and the students brought to grade level as measured by The Ginn Reading Program (1985), when taught reading with brain compatible techniques.

Hypotheses

The major usefulness of case studies is not as tools for testing hypotheses, but rather in producing hypotheses which can be tested through more rigorous investigation (Ary, Jacobs, and Razavieh, 1972). The case study differs from quantitative research in that the formulation of hypotheses in the case study refers to probable causes of the problem. The case study makes possible a synthesis of many different types of data in drawing educational inferences (Barr, Davis, and Johnson, 1953).

In this case study, three remedial students received reading instruction using brain compatible techniques to determine whether a pattern of continued failure could be changed and these students be brought to grade level by the end of second grade. The following hypotheses were considered in this study:

1. The brain compatible techniques used for remediation will be effective instruction for all three members of the remedial reading group as measured by The Ginn Reading Program (1985).
2. The three members of the remedial reading group will achieve the skills and objectives of the Ginn basal reading series when taught with brain compatible techniques.
3. The use of brain compatible techniques used for remediation will strengthen the dispositions of

interest, effort, and mastery toward reading in the three members of the remedial group.

Theoretical Rationale

This study is based on the premise that using brain compatible techniques will improve students' reading skills in the non-threatening environment established to encourage children to take risks in their learning. Risk, as defined by Leslie Hart (1983), is what the individual voluntarily attempts in order to meet the built in human need for challenge, excitement, variety, and adventure. Brain compatible instruction provides activities within reason that offer students the degree of risk they choose and the opportunity to carry them out in a safe, secure environment. Students are encouraged to work toward learning goals in which they seek to increase their understanding or mastery of something new. Children gain enjoyment and satisfaction from the effort involved as well as from the mastery achieved. Because the environment for learning is not dominated by workbooks, drills, and seatwork, and achievement is recorded only if it attains an acceptable level of mastery, students are freed from the threat of being graded for failures. Flexibility in scheduling allows time for students to become immersed in the learning activity without the fear of having to reach a teacher expected goal at a specified time (Katz, 1988). A classroom

where trust, choices, and adequate time are key factors in the planning and implementation of instruction will provide for the greater gains for the individual (Kovalik, 1986).

Reading instruction in the brain compatible classroom would include ample opportunities for students to interact with each other. Verbal and written communication in realistic situations would be a major part of the reading program.

In brain compatible instruction, emphasis is placed on reality learning rather than on book learning. Practical, useful learning can be achieved only through reality. In the brain compatible classroom, students work on real projects and problems rather than on contrived assignments and busy work (Hart, 1978).

Students are engaged in activities that challenge the brain and provide substantial amount of input. Input serves as the raw material from which patterns are extracted from confusion, and that is the basis for learning (Hart, 1983). A variety of teaching methods is employed in order to respond to the students' preferred modalities. Student participation is greater in learning if the student feels safe and successful with the style of the material being presented (Kovalik, 1986). Interaction with many people, exposure to a great variety of equipment and materials and ample opportunity to use them, multiple presentations through exhibits, performances, multimedia events and

demonstrations provide opportunities for maximizing input for students (Hart, 1983).

In addition to the test results, achievement evaluation is based on the observation of the dispositions of the students toward reading. Dispositions toward learning are broadly defined by Lilian Katz (1988) as enduring habits of mind or characteristic ways of responding to experiences. The development of desirable dispositions toward reading is as important for the students in the reading instruction as the acquisition of reading skills.

Brain compatible instruction that creates a non-threatening environment, encourages students to take risks, employs a variety of teaching methods, and provides substantial amounts of input, can produce the desired learning outcomes for reading achievement.

Definition of Terms

For the purpose of this study, the basal reading series used was The Ginn Reading Program (1985). This program reflects the principle that learning results from teacher-led instruction followed by practice and application of skills (Clymer, Indrisano, Johnson, Pearson, and Venezky, 1985). The definitions included in "Reading Components" and "Reading Assessment" are taken from The Ginn Reading Program (1985).

Reading Components

Comprehension - the ability to understand (in reading, the ability to understand oral or printed language).

Decoding - the ability to use sounds and structural clue to identify unfamiliar words.

Vocabulary - the recognition and use of words in context.

Reading Assessment

Level Tests - assessment of a student's achievement in relation to the content of the specific level.

Score - the total number of correct answers on each test.

Suggested Passing Score - the total number of correct answers needed to move into the next reading level (80% of the highest possible score).

On Level Achievement - when most of the scores in the class are above the Suggested Passing Score rather than spread out in the familiar "bell-shaped curve" of standardized tests.

Below Level Achievement - students scoring very low (below 70%) on their total score on the level tests.

Remedial Students - students who are identified as below grade level in comparison to other students of the same age or grade level.

Dispositions - attitudes of mind; characteristic ways of responding to situations (Katz, 1988).

Brain Compatible Instruction

Learning Environment - the combination of external or extrinsic physical conditions that affect an individual (Hart, 1983).

Learning - the acquisition of useful programs or information (Hart, 1983).

Learning Style - the manner in which an individual favors as a means of learning (also known as modality) (Carbo, Dunn, and Dunn, 1986).

Modalities - the preferred sensory channel (visual, auditory, kinesthetic, or tactile) by which an individual learns (Kovalik, 1986).

Neocortex - the part of the brain constantly demanding new input and variety, and insists on taking risks (Hart, 1983).

Patterns - categorizing and storing new information received by the brain (Hart, 1983).

Programs - an established sequence of steps or actions intended to achieve some goal (Hart, 1983).

Brain Compatible Teaching Techniques

Active Learning - a form of ownership, a sense of involvement, a degree of personal control over what is being learned, and practice in making choices (Kovalik, 1986).

Cooperative Learning - the interaction of a limited number of students working together to achieve a common goal (Kovalik, 1986).

Feedback - the immediate return of information on how well a program is working to achieve its goal (Hart, 1983).

Individual Instruction - working with one student at a time to achieve a set goal (Carbo, Dunn, and Dunn 1986).

Input - the information offered to the brain in a given situation; the greater the input, the greater the possibilities for learning (Hart, 1983).

Mastery - allowing as much time as an individual needs to learn thoroughly, in contrast to giving a score or grade in a fixed period of time (Hart, 1983).

Random Ordering - input presented in chance or jumbled order, in contrast to some logical approach or a conventional sequence; the order in which the brain prefers to learn (Hart, 1983).

Reality - as found in real life situations in contrast to what has been prepared, ordered, or fragmented in conventional formal education (Hart, 1983).

Risk Taking - an individual response to the built-in urge to take chances, to dare, to seek excitement, and new events and their stimulation (Hart, 1983).

Limitations

The three students in this case study were selected for reading instruction using brain compatible techniques because they were designated as below grade level in reading according to the Ginn Reading Program (1985) and based on the judgment of the classroom teacher.

The students were removed from the regular classroom setting and instructed as a group in a separate room. Freed from the distraction of other students, the three students were able to focus on the one activity being presented. The students were permitted to move freely about the classroom. There were ample opportunities for the students to choose working with each other, individually, with the teacher, or as a whole group. Activities were designed to provide for the visual, tactile, auditory, and kinesthetic learner. Students were permitted to eat a snack during reading instruction.

This study was limited to the use of one basal reading series. Instruction was based on the skills and objectives of The Ginn Reading Program (1985), but the methods of instruction used the brain compatible techniques as presented by Leslie Hart (1983) and Susan Kovalik (1986). Assessment of the students' reading achievement included the use of the unit and level tests of the Ginn program, but the techniques of brain compatible learning were used in the administration of the test and in the interpretation of the

test results. Tests were taken when students reached a level of mastery of the skills and objectives of the program and not necessarily at the end of a unit or level.

Using the case study as a means of research also limits the reliability of this instructional method since the case study is used to obtain information about an individual, and does not necessarily produce valid generalizations. Although the method of instruction may be beneficial for the three students involved in this study, the narrowness of the case study method, the use of a single basal reader series, the principal as the instructor, and the small number of subjects makes the application of this theory of instruction for other students limited in its reliability.

CHAPTER TWO

Review of the Related Literature

Introduction

This study was undertaken to determine whether a pattern of continuing failure in reading for three remedial students could be changed and the students be brought to grade level as measured by The Ginn Reading Program (1985), when taught with brain compatible techniques.

Leslie Hart suggests that classroom instruction must be compatible with the nature of the brain, rather than brain-antagonistic like most conventional classroom teaching. Brain compatible instruction, in a non-threatening setting that permits uninhibited use of the neocortex, will result in far better learning, climate and behavior (Hart, 1986).

In Glasser's Control Theory in the Classroom (1986), he asserts that up to 50% of students fail to learn because they feel their basic needs to survive, find love, power, fun, and freedom are not met in school. When students are not able to see their basic needs being met, they refrain from working academically and therefore learn very little (Madden, 1988). Robert Gagne states that "the essential task of the teacher is to arrange the conditions of the learner's environment so that the process of learning will be activated, supported, enhanced, and maintained" (cited by Hart, 1983).

Reading Instruction

Our nation's schools have been in the midst of crisis for a long time. We have begun reading earlier, continued reading instruction longer, and spent many hours and large sums of money on developmental, remedial, and special education programs. Yet, approximately 25 percent of our students have reading difficulties and as many as 20 percent of all American 17-year-olds were functionally illiterate in 1975 (Carbo, 1986).

The inability of our schools to teach reading well is not a new problem. Flesch's Why Johnny Can't Read in 1955 was the focus of national attention. Teachers have been trying to increase reading ability for decades but despite professional expertise, many innovations, and massive federal funding, past and present reading programs have produced highly unnacceptable and unnecessary numbers of children who read poorly (Hart, 1983).

The Reading Report Card from the National Center for Education Statistics (U.S. Department of Education) in 1985 reported the following findings:

> Six percent of 9-year-olds in 1984 could not follow brief written directions of select phrases to describe pictures. Failure to perform these rudimentary reading exercises places them in danger of future school failure.
>
> Forty percent of 13-year-olds and 16 percent of 17-year-olds attending high school have not acquired intermediate reading skills. They are unable to search for specific information, interrelate ideas, or make generalizations about literature, science,

> and social studies materials. Inability to perform these tasks raises the question of how well these students can read the range of academic material they are likely to encounter in school.
>
> Just 5 percent of students at age 17 have advanced reading skills and strategies that enable them to synthesize and restructure ideas presented in specialized or complicated texts used by professionals and technical workers.

"Reading is a basic life skill. It is a cornerstone for a child's success in school, and indeed, throughout life. Without the ability to read well, opportunities for personal fulfillment and job success inevitably will be lost (Anderson, Heibert, Scott, and Wilkinson, 1985)."

Present educational methods in reading instruction are not providing programs that are producing readers. "In most classrooms, the instruction will be driven by a basal reading program....The observation that basal programs 'drive' reading instruction is not to be taken lightly. These programs strongly influence how reading is taught in American schools and what students read. This influence is demonstrated by studies that have examined how time and instructional materials are used in classrooms. The estimates are that basal reading programs account for 75 percent to 90 percent of what goes on during reading periods in elementary school classrooms (Anderson, Heibert, Scott, and Wilkinson, 1985). These basal texts define the scope and sequence of instruction, and the accompanying teacher guides (especially at the elementary school level) provide a road

map from which few teachers make major detours (Tyson, 1989).

"In their review of the research on instruction as it relates to the teaching of reading, Pearson and Tierney state that the current instructional paradigm most commonly used has the following characteristics:

1. use of many practice materials
2. little explanation of cognitive tasks
3. little interaction with students about the nature of specific tasks; and
4. emphasis on one correct answer to the extent of supplying the answer for students if they exhibit problems with or confusion over a task.

Pearson and Tierney imply that this is perhaps a general model used in all content areas at all grade levels. If this is true, current instructional practice violates what appears to be necessary for effective teaching and learning of basic cognitive abilities, specifically the intervention of a teacher between a task and the students" (Marzano, 1986, p. 25).

Reading instruction primarily involving the use of repetitive tasks, worksheets, and workbook material will be counter-productive. "The Commission on Reading (1988) has reported that most language-arts instruction in our schools - up to 70 percent - consists of simple 'seatwork':

fill-in-the-blank workbook exercises that rarely require or encourage the development of significant comprehension ..." (Bennett, 1988, p. 13). In many classrooms, pupils spend 60 to 70% of their allocated reading time completing tasks that focus on descrete skills (Anderson, Heibert, Scott, and Wilkinson, 1985). To put the figures another way, children in the primary grades spend about an hour a day filling in worksheets that provide limited feedback from the teacher and create conditions to reinforce errors in skill development (Winograd and Smith, 1987).

Reading is the process of constructing meaning from written texts. It is a skill that requires the coordination of a number of interrelated sources. "Reading can be compared to the performance of a symphony orchestra.... First, like the performance of a symphony, reading is a holistic act. In other words, while reading can be analyzed into subskills such as discriminating letters and identifying words, performing the subskills one at a time does not constitute reading. Reading can be said to take place only when the parts are put together in a smooth, integrated performance. Second, success in reading comes from practice over long periods of time.... Indeed, it is a lifelong endeavor. Third, as with a musical score, there may be more than one interpretation of a text. The interpretation of the text depends upon the background of the reader, the purpose for reading, and the context in

which reading occurs" (Anderson, Heibert, Scott, and Wilkinson, 1985, p. 5).

There is no best way to teach children to read. Each child learns differently and it is the match between how the learner learns and how the teacher teaches that determines what is learned and how much is learned (Carbo, 1986). An essential aspect of learning to read is the rapport that is developed when teachers take the time to share the pleasures of reading. That kind of sharing can not take place if teachers accept the attitude that their task is to manage the pre-set lessons and when success in reading is defined as high scores on standardized tests (Winograd and Smith, 1987).

Reading Evaluation

Our knowledge of reading processes and reading instruction is at odds with our system of reading assessment. We, therefore, are running the risk of misinterpreting the assessment data. If tests do not measure what we call skilled reading, then the tests cannot determine if progress is being made. High scores on existing tests do not guarantee good readers and low scores do not necessarily indicate poor readers. Tests may be insensitive to growth in the abilities we most want to foster and may be misguiding information (Valencia, Pearson, Peters, and Wixson, 1989).

Chittendon (cited by Strickland, 1990, p. 23), states that although standardized tests have undergone severe criticism as evaluative measuring devices for children's literacy, they unfortunately continue to be highly regarded by some policy makers as definitive evidence of young children's learning. Serious questions about the use of standardized tests have been raised because of the assumptions underlying such tests, particularly the narrowness with which literacy is defined (Valencia and Pearson, 1987).

Forty-six states require testing in reading. One half of those states have purchased a test or a set of test items from standardized test publishers. The other states requiring testing in reading have developed their own reading assessments, and most have modeled their tests after either existing norm-referenced standardized reading tests or the specific skills, criterion referenced tests that do not reflect current knowledge of reading processes. (Valencia, Pearson, Peters, and Wixson, 1989).

Comprehension tests that are used today often present students with specially constructed texts followed by multiple choice questions that focus on details and explicit information. The given passages fail to approximate those that students encounter in the classroom and they artificially preclude questions that encourage complex reasoning, which is the essence of comprehension. The tests

do not account for the impact that prior knowledge, metacognitive strategies, and dispositions have on comprehension (Valencia, Pearson, Peters, and Wixson, 1989).

Most educators agree that assessment exerts great influence on curriculum and often becomes curriculum. The motivation of educators who "teach to the test" may not simply be for higher test scores, but may result from the belief that test publishers better define what is important to teach than they can. Teachers look to test results to help make curricular and instructional decisions (Valencia, Pearson, Peters, and Wixson, 1989).

Children who have failed to catch on to a set curriculum, and are determined by standardized tests to not meet the expected score, keep falling farther and farther behind. As early as kindergarten, standardized test results are used to make important decisions about promotion, retention, and placement (Strickland, 1990).

In the early 1980's, reading teachers, specialists, and numerous researchers began to contend that the prevailing skills-based approach to instruction and assessment was not appropriate. Teachers were viewing skills as things that could be taught, learned and used independently, rather than teaching them in an integrated manner (Roeber and Dutcher, 1989). Readers build meaning by bringing together knowledge they already possess and information gained from the text,

and filtering that information through the purposes they bring to the task at hand. The process is fluid. It varies from one reading situation to another, depending on prior knowledge, motivation, interest, culture, task, setting, and text. In order to become proficient in reading, one must possess key skills, but must also learn how to integrate these skills and adapt them to the purpose, text, and context. Good readers not only decode words but also build meaning by integrating their own knowledge with information presented by the author. Good readers master skills and also apply the skills flexibly for a variety of purposes. Good readers read in school, but also have developed a disposition for reading (Valencia, Pearson, Peters, and Wixson, 1989).

Testing, whether standarized or teacher generated, seems to come into increasing use as learning failures become more evident. Administrators and boards seem to feel that doing more testing will prove that the school is making a greater effort in teaching. But giving tests takes away time from the instruction and learning and the more tests are emphasized the more teaching focuses on the learning of right answers. Diagnostic tests at best disclose areas of weakness in answering other tests. They may fail utterly to show why there is a weakness and not provide a road to remediation. Individual student progress can be far better

followed and guided by reporting the accomplishments of students as they occur (Hart, 1983).

The need for change is felt at national, state, and local levels. Reading instruction and assessment must focus on larger concepts and curriculum strands with strong emphasis on constructing meaning from the printed page. Students must have the opportunity to apply their reading skills to a variety of real-life texts and tasks (Valencia, Pearson, Peters, and Wixson, 1989).

Brain-Compatible Instruction

The human brain is an instrument that will not be passive, that resists direct instruction unless it makes sense to that brain. It will only admit those inputs it decides to admit and each brain processes what it does admit in its own individual way. Processing depends little on what or how the teacher has presented the material, but depends greatly on the total previous stored experiences in that particular brain (Hart, 1978).

The more experiential knowledge the learner has, the greater will be the receptivity and application of new material through active learning. The first phase of the typical reading lesson is the preparation phase. In this phase the teacher is supposed to introduce the new words that will be used in the selection and make sure that children possess the background knowledge required to understand the story. Classroom observation reveals that

preparation for reading is the phase that is most often slighted, or even skipped altogether. When teachers were asked why this preparation was omitted, the response most often given was the lack of time (Anderson, Heibert, Scott, and Wilkinson, 1985).

The most effective learning for length of retention and recall engages the learner in multi-sensory hands-on experiences (Whyte, 1989). Thus the standard presentation, lecture, recitation, and discussion that take up most of the instructional time in classrooms; cannot be expected to produce learning in any reliable way (Hart, 1978).

Brain theory tells us that the brain is continually attempting to categorize and pattern new information with what is already stored. In an attempt to store new information, the brain "calls up" or matches, compares, and patterns incoming information with similar or perceived to be similar factors already stored in an individual's memory. The more meaningful, relevant, and complex the external sensory input is, the more actively the brain will attempt to integrate and develop "program structures." The most effective learning occurs when external sensory input challenges the brain to call up the greatest number of appropriate programs, expands on the already existing programs, or develops new programs. The more senses that are involved in the learning process, the more complex the

matching and the development of programs will be (Nummela, 1986).

A wide variety of activities should be offered for students to express their learning (Whyte, 1989). A lesson with too little challenge, too much threat, or a lack of necessary complexity will not involve students in the lesson, and will, in fact, cause their attention to be diverted to whatever else is available. Learning occurs constantly (consciously and unconsciously) and when meaningful, comprehensive learning does not occur, the brain continues to engage in personally meaningful activity and not the lesson (Nummela, 1986). Children will learn best if their limits are stretched, if their emotions are engaged, and if they are helped to understand themselves and their own special ways of thinking and seeing the world (Levy, 1983).

Learning experiences should be pleasurable and deal with novel, unexpected, or discrepant information. This type of interaction causes a network of nerve fibers called the reticular formation, to switch on the brain, thus making the person more alert and allowing the limbic system to engage the whole brain. The reticular formation helps regulate the brain's level of awareness. The limbic system is significant in learning in that it acts like a switchboard monitoring and sending messages to the appropriate places in the cerebrum. This system is the

focal point for monitoring and controlling emotions. Strong emotions that are associated with learning have a greater chance of remaining in long-term memory. The negative side of this is that if the strong emotion is negative and causes painful feelings, the brain may actually guard against recalling the learned information. Challenges engage the whole brain and generate excitement, interest, and attention (Whyte, 1989).

In the brain-compatible classroom, the student should be free to move around, talk with many people, communicate, calculate, explore interests, and work on real projects and problems rather that contrived assignments and busy work. Young students in particular must talk to learn well, for a great portion of the human brain is devoted to language. Yet in most classrooms, the teacher talks constantly and the students are required to listen (Hart, 1978). Talking is important for "whole brain" development and learning. A "stop talking" environment interferes with whole brain learning (Whyte, 1989).

The teaching-learning process is greatly facilitated when performed in a learner-preferred environment (Turner, 1985). It is helpful to be able to identify the learning style or modality of the learner. The child's participation will be greater in learning if he or she feels "safe" and successful with the style of material being presented. A

successful learning environment is created when the child's preferred modality is used (Kovalik, 1986).

A relaxed and secure environment enhances learning. When threats or fears are high, the limbic system "shuts down" the cerebrum and then only rote learning can occur (Whyte, 1989). A non-threatening environment where trust, choice, and adequate time are key factors will provide a brain-compatible atmosphere for learning (Kovalik, 1986).

Leslie Hart (1983) in his book Human Brain and Human Learning suggests that the process of learning can be defined as the extraction of meaningful patterns from confusion. The brain centers on programs and patterns. A program establishes a sequence in the brain that works best for the individual. The brain builds programs by executing them correctly so that they achieve intended results. Students do not acquire programs by being talked at, explained to, or prodded for "right answers" - nor by doing them incorrectly, reexplained to, given low marks, or failed. Teachers must move from being instruments of instruction to directing whole learning process. Students can and will learn from suitable materials, devices, and tutoring - all designed to promote "fail-proof" guidance in building useful programs (Hart, 1978).

Is the brain compatible approach a theory that has proven successful? There are some indications that confirm this theory:

- Maria Montessouri achieved spectacular learning results through her early methods.
- During World War II many children were shifted from rigid London schools to makeshift evacuee arrangements. Their learning flourished.
- At Yale, Omar K. Moore and his associates showed beyond question that ordinary children aged 3 and 4 could easily learn to read and write on typewriters. Later, in a school, he demonstrated that first-graders could be brought to the sixth-grade reading level and higher - a dazzling success that has been persistenly ignored.
- A now considerable body of research indicates that student-teach-student and other "unskilled tutoring consistently produces sharp gains.
- The success and popularity of "Seasame Street" a "pure" example of random and very high input, has been documented.

All of these achievements and findings appear to support the theory of brain-compatible environments and methods (Hart, 1978).

Case Studies

The study of reading difficulties often takes place in a manner similar to reading instruction. The designated curriculum is set for all students of a particular level, and the method of instruction is determined by the teaching guide. Assessment is determined by the reading test produced by the publishing company of the reader, or by the standarized test established by the Department of Education. With these results, good readers are distinguished from poor readers. Although this method is highly acceptable in our educational process today, many students are still not able to read at grade level. Educators need to evaluate more closely the effect these processes have on the individual (Valencia, Pearson, Peters, Wixson, 1989).

The potentially most valuable method known for obtaining a true and comprehensive picture of individuality is the case study. The case study makes possible a synthesis of many different types of data and may include the effects of otherwise elusive personal factors in drawing educational inferences. The case study considers processes and the interrelationships among factors that may condition these factors (Barr, Davis, and Johnson, 1953).

The greatest advantage of a case study is the possibility of an indepth study that attempts to understand the whole child in the totality of the child's environment (Ary, Jacobs, and Razavieh, 1972). Bartlet and Shapiro (1958) present a case study account to explain the experimental investigation and remedial treatment of a nine-year old boy who showed a severe reading difficulty which had to that point proven intractible to a variety of remedial methods employed by well qualified teachers. The result of the study indicated that the way the child learned required emphasis on visual cues, the use of small units, considerable overlearning for adequate retention, and the avoidance of kinesthetic cues. The finding helped explain the successes and failures of the remedial teaching. The child had been referred to as having a "specific reading difficulty", whereas in actuality he was not able to form associations within and across certain sensory modalities. This particular case study shows not only the difficulties

the child was experiencing in reading, but also indicates that the study of the individual revealed greater insights than the results of psychological work that is often limited to the use of tests of established standardization and validity (Bartlet and Shapiro, 1958).

Most case studies arise from endeavors to solve problems. Freud's case studies began with his attempt to help his subjects solve their personality problems. As he investigated more deeply the patients' personalities, he realized that the relationships that he observed between them and their environments might also be characteristic of other individuals with similar problems (Ary, Jacobs, and Razavieh, 1972).

The major usefulness of case studies is not as a means for testing hypotheses, but rather in the production of hypotheses, which can then be tested through other investigations. The insights Piaget gained in his case studies on the intellect provided useful hypotheses that have been used in other investigations. His case studies were conducted to learn more about the mental growth in children and not for the benefit of the subjects involved (Ary, Jacobs, and Razavieh, 1972).

Carbo, Dunn, and Dunn (1986), in supporting their philosophy of the importance of matching reading style to the individual, present the case study of eight-year old Jimmy who in 1977, was declared severely learning disabled

and emotionally disturbed by the school's Committee on the Handicapped. The child was neither. Jimmy was a child of normal intelligence who could not learn to read with the method his teachers used with him. By ninth grade, he was reading on a second grade level. Jimmy's reading failure started right from the beginning. The reading approach used with him was phonics, and he did not have the auditory and analytical abilities needed to succeed with that method. Because of his reading difficulties, he was given repeated intensive remedial drills in decoding, exactly what he could not do. Jimmy's case was used as an example for supporting the hypothesis that mismatching a youngster's reading style could result in repeated failure.

Although case study was once limited primarily to identifying problems of maladjustment, such as school failure, the case study today is also used to investigate the normal or bright child, successful investigations and agencies, and well-organized communities or effectively functioning cultural groups (Good, 1963). Since persons and things which are the objects of research are not only typical, but also individual, generalizations about them do not exhaust the possibilities of our knowledge. The case study is a more unique research tool in that it provides knowledge about particular concrete entities. In addition to generally applied information, it is necessary to know the individual in order to deal with him or her as something

other than an abstraction. In using the case study, it is this particularized information that is sought (Wise, Norberg, and Reitz, 1967).

The case study is a valuable tool for understanding the individual or for gaining knowledge about a particular type of behavior. Using the case study of three students who were identified as below grade level as measured by The Ginn Reading Program (1985), to determine the effect of instruction using brain compatible techniques, benefitted not only the subjects, but also supported the hypothesis that children can learn when instruction and environment match the nature of the brain.

CHAPTER THREE

The Subjects, Procedures, and Observations

This study was undertaken to determine whether a pattern of continuing failure in reading for three remedial students could be changed and the students brought to grade level as measured by The Ginn Reading Program (1985), when taught with brain compatible techniques.

In reviewing the mid-term examinations, it was noted that three second graders failed the first semester cumulative examination in Language Arts. Upon further investigation, it was noted that this examination included testing of skills from the second grade reading book, an assessment of skills which these three students obviously lacked since they were still receiving reading instruction in the first grade reading book. The other 17 students in the second grade who had received a passing grade in the examination, had already received instruction in the second grade reader for the first semester of second grade.

Discussion with the classroom teacher and other members of the faculty revealed the likelihood that these three students would remain below grade level throughout the eight years in the school becuase they were already below the recommended reading level. This pattern was traced throughout the school and at every grade level there was one reading group that was six to twelve months below grade level according to the Ginn basal reading series in use.

Apparently, once a child was below grade level in reading, that child would remain below grade level and at risk of failing reading and/or the entire curriculum for the year.

In order to prevent this possible failure, a process of reading remediation using brain compatible techniques was begun with these three students in the second semester of second grade.

Subjects

This study was undertaken in a small rural school with an enrollment of 220 students. The three students involved in the study were in the second grade and had been members of the same class in the same school since kindergarten. The three students had received instruction from The Ginn Reading Program (1985) beginning in kindergarten with Level K of the basal series. Reading instruction from the same reading series continued throughout first grade where the three students were grouped for reading instruction because they were not able to maintain the pace of the other two reading groups in the class. When these three students moved into second grade, they continued reading instruction in the first grade reader because they had not completed the first grade level of the series. These three students remained in a separate reading group because it was determined by the teacher that they were not capable of on-level work with the remainder of the class. The three

students, however, were expected to work on second grade level in all other areas of the curriculum because they were grouped only for reading. It was therefore decided that a program of remediation would commence using brain compatible techniques to see if the three students could be brought to grade level in reading by the end of second grade, a five month period.

Procedures

To begin the process of remediation, the reading skills of the second grade readers from the Ginn series were outlined. The skills were grouped into sequences that would allow for mastery learning over a period of days, instead of the one day presentation of the skill followed by several days of workbook practice extended over several weeks suggested by the series. Long range planning for vocabulary instruction included independent study of vocabulary words through word lists and incorporation of actual story books to supplement vocabulary development. Vocabulary games were created that would allow students to practice the words using a variety of materials. Comprehension skill development plans included real life projects which would include presentations and instruction through art, drama, music, computer technology, and oral and silent reading as well as incorporation of library skills. Decoding skill development would include an intensive phonetic review with emphasis on recognition of patterns in words.

Classes for these three students were conducted in a separate classroom and each 30 minute class period began with informal discussion of the story or the assigned work of the previous day. Students were encouraged to speak with each other during this sharing time and throughout the class time. A significant part of the class time was used to prepare the students for the new story they would read that day. Preparation included introduction of new vocabulary within the context of the story, explanation of cultural differences when the stories involved characters or settings that were unfamiliar to the students, and relating past experiences of the three students to the experiences of the characters in the story. The students were able to choose their preferred manner of learning for the story each day, from among silent reading, oral reading, or listening to the selection read by the teacher. The students were encouraged to vary their choices to avoid the same type of reading each day.

Reading skill sections were introduced through materials such as maps, musical instruments, game boards, story books, computers, work of other students, and illustrations. The Skillpack (Ginn, 1985), that accompanies the Ginn series, was used for instruction when it was judged by the remedial teacher to be helpful to the students for reinforcing or practicing skills already learned. Because the students expressed an extreme dislike for the workbook,

a negative disposition frequently displayed by the students' request to not work in this book, it was rarely used with the students. However, when the workbook was used, the same skill would be practiced to the extent that the students developed mastery of the skill. The sequence of the book was not followed because only one page of skill practice was given in each story. If the students needed additional practice after completing one page, another page in the book was selected for practice or an activity was chosen that would help reinforce the skill. The reading skill presented or reinforced each day was based on some part of the story that was just read. Examples of the skill were found in the story and real life applications were made through the activities in which the students participated immediately following the class instruction. Students returned to the regular classroom to work on the assigned activities. In the regular classroom, through arrangements with the classroom teacher, the children were given the choice of working independently, with a partner, or as part of the whole group when completing the assigned project.

Projects varied in length and complexity. When a positive disposition of interest was expressed by the students, more time was alloted for the project. Based on students' comments such as, "Can we keep working on this back in our classroom?", or "Can we take this home to finish

it?", assignments and projects were adapted to meet the interest of the students.

One such project included reading stories by individual authors the students had come to know through their class reading. A unit was developed on the Jack Kent stories in which the students selected their favorite story by the author, illustrated scenes from the story, and prepared an oral report to share with the group on why that story was most appealing. The skill development in this unit was use of descriptive words. The students identified descriptive words in their story selection, and included the use of these words in their oral presentations.

Other projects included a unit on detectives in which the students conducted scientific experiments, traced animal tracks, finger printed themselves and identified the characteristics of their own prints. One of the skills stressed in this unit was attention to detail, and distinguishing between reality and fantasy became part of the comprehension skills for the unit.

Each unit was developed through a theme and instruction in the skills of the reading level was incorporated into the theme. When studying a unit on animals and their natural habitats, a disposition of curiosity and interest was evident in the students. After reading a story on Andre the seal, the students wanted to know if he was still alive. They wrote letters through a word processing program and

sent the letters to the New England Aquarium inquiring about Andre. When the students received a response to their letters, they learned about Andre the seal, but they also experienced the joy and value of written communication.

Students' progress was evaluated by means of the unit tests that are part of The Ginn Reading Program (1985). However, when it was determined that what was taught was not always tested through the unit tests, several modifications were made in using the tests. For example, in sections of the tests where the test evaluated decoding skills of the unit, the actual test items were measuring comprehension or vocabulary. The following examples illustrate the disparity of the stated objectives and the actual component tested.

Example 1

Which word tells about a bird with feathers of many colors?

a. colorful b. coloring c. uncolored

This example from the Level 8-4 test is used as an item for decoding. The students are actually being tested on vocabulary because they would need to know the different meanings of the prefixes and suffixes used with the root word color.

In other sections of the tests, there was often more than one corect answer. Example 2 from Level 8-3 illustrates this point.

Example 2

A _____made our costumes for the show.

a. tailor b. painter c. farmer

Although the manual wanted the answer tailor, any of the answers would have been acceptable. The students were given opportunities to explain their response, and if the response was logical, the answer was accepted even though the answer key indicated a different response.

Because the tests were lengthy, the tests were not always given in entirety in one class period. The students took one or two sections of the test when it was judged by the reading teacher that they had mastered the skill evaluated in that section of the test. The purpose of testing was to provide feedback to the student that a skill was mastered and that application of the skill could be used in other reading activities. After the students had spent several days practicing and applying a comprehension skill such as main idea, the students were permitted to take that section of the test.

During testing, students were given the options of working at a desk/table, or choosing a comfortable area in the classroom. The students were also given the option of completing tests orally or in writing according to their preferred learning modality.

After the test or section of the test was completed, responses were checked to provide immediate feedback to the students. Errors were corrected by the students and reinforcement of the skills was provided based on the need of the individual student.

Observation

The three students in this study were taught as a group, but each student was considered individually in this study. Using case study method provided a valuable means for obtaining a comprehensive picture of the individual (Barr, Davis, and Johnson, 1953). Each of these students was identified as remedial but the difficulties they experienced in reading were unique to the individual. Each case includes the following data: teacher observation, remedial reading instruction, evaluation, and recommendations.

Case 1 - Lisa

Teacher Observation

Because of Lisa's failing grades on the mid-term examinations, a conference was held with Lisa's parents, her teacher, and the principal to discuss the possibility of Lisa's retention in second grade. The conference was requested by the teacher. The teacher explained the behavior she was observing in Lisa on a day to day basis in reading class. She commented that Lisa's oral reading was quite fluent for her level. Her independent decoding skills

remained weak. Her poor speech patterns interfered with grammatical analysis. She described Lisa as distracted and immature and lacking interest in reading.

It was suggested that Lisa's parents work with her at home by continuing her oral reading on a daily basis. It was also suggested that Lisa make corrections from her reading workbook as part of her homework each evening. Both parents agreed to continue working with Lisa. The parents were informed at that time that Lisa would receive reading instruction from the principal for the remainder of the year.

Remedial Reading Instruction

During the first few weeks of remedial reading instruction, an informal analysis was completed to determine Lisa's preferred learning style (Carbo, Dunn, and Dunn, 1986). Lisa was identified as a strong tactile/kinesthetic learner. When given the option, she preferred to read in an unstructured environment and found a favorite spot on the floor for reading. Lisa had great difficulty completing lengthy assignments and often carelessly completed workbook pages. Lisa enjoyed variety in reading instruction and preferred to work on projects that involved multisensory experiences. She enjoyed writing and acting out stories she composed. She wrote lengthy stories and was anxious to type her stories on the computer. Lisa had a vivid imagination and her stories and projects reflected her divergent

thinking. Lisa was persistent in a project if the project was of interest to her.

At the beginning of each class period, Lisa was eager to share her reaction to stories or projects on which she was working. She was not as eager to listen to the stories of her two classmates, unless the story caught her attention in the beginning. During times of oral reading, she would often correct the mispronounced word or fill in the word that her classmates would find difficult. Because of her fluency in oral reading, she would become impatient with the halting patterns of the other two students in the class.

The presentation and application of comprehension and decoding skills were challenging for Lisa. The skill presentation suggested by the textbook was of little interest to Lisa, and when skills were presented in this formal manner, Lisa would easily be distracted. If Lisa was asked to practice the new skill in the Skillpack, the pages would often be incomplete or completed with many errors. She experienced frustration in having to complete workbook pages and expressed her frustration by saying: "Some days I want to write neatly and get all the answers right, but most days I just want to scribble all over the pages."

The most beneficial skill presentation for Lisa was through real life experiences. If the skill presented was understanding details, the presentation had to include detailed information on a topic Lisa had already

experienced. The application of the skill had to include an activity or project such as drawing the castle described in a story she had read or creating her own castle. Finding details in a short selection from the workbook or filling in blanks in the workbook did not provide beneficial application of the skill. Although Lisa was able to complete these workbook pages, she would often have many errors. It was only when she orally read the workbook pages to the teacher that it was determined she knew the skill, but resisted practicing the skill through workbook format.

The formal evaluation of The Ginn Reading Program (1985) through unit and level tests was also challenging for Lisa because the format was the same as the workbook. In addition to the workbook format, Lisa's divergent thinking also created questionable responses. In one of the test items that evaluated decoding words in which y is changed to i before endings, the selection read:

This is the _____ tape I ever used.

a. stickiest b. still c. happiest

The acceptable answer according to the manual was stickiest. Lisa, however, chose happiest, because she explained that the word tape meant video tape and you could not have a sticky video tape.

Evaluation

As the year progressed, Lisa's ability to complete assigned workbook and test activities increased despite her

continued dislike for the tasks. In the middle of May, the entire second grade class took the "Reading Skills Test", a reading test developed by Scholastic News (1990). Lisa answered 37 of the 38 questions correctly and scored as well or higher than 50% of her class. In her final examination in Language Arts, she scored 83%, within the range of her classmates' 81% to 100%. Her achievement on this examination clearly indicated the progress she had made since taking the mid-term exam in Language Arts in January when she failed the test with a 62% and received the lowest grade in the class.

Another area of development that indicated the progress Lisa made during the months of remediation, was her disposition toward mastery and effort. Lilian Katz (1988) describes dispositions as characteristic ways of responding to experience across types of situations. Since dispositions are not learned from textbooks, lessons, or lectures, they also can not be measured by test results. The disposition toward mastery and effort was observed in Lisa's response to invitations to discover something new, or experiment with something that created an interest in her. Lisa accepted the challenges in the projects and activities presented in reading classes. She would become so involved in an activity, that it would be difficult to turn her attention to the next class. During one class session when Lisa was typing one of her stories on the computer, she

requested to skip recess that day so she could finish her story. Another time she related how many stores she had visited on the weekend with her grandmother in order to find a book she had read in class that she wanted to buy. Lisa was persistent in finding answers to questions. If the answers she received in the class setting did not satisfy her curiosity, she would continue to seek the answer until she was satisfied. Lisa did not need to be rewarded for completing projects and activities that interested her. Her reward was the enjoyment and satisfaction from the effort involved as well as from the mastery achieved.

Recommendations

Lisa was promoted to the third grade. A recommendation has been given that she be permitted to express her learning through tactile/kinesthetic modalities, and that workbook activities be limited for her. Lisa continues to need encouragement to complete tasks that she judges meaningless. If Lisa is taught according to her preferred modality, she will feel safe and successful with the style of material being presented.

Lisa's teachers will need to provide opportunites for completing tasks that are of interest to her. Her disposition to become totally involved in an activity may be threatened by frequent interruptions. Her teachers will need to build flexibility into the time they give for various activities. An excessive emphasis on skilled

performance will have a negative effect on Lisa and may create a condition that undermines her natural interest and curiosity. Lisa will continue to thrive in the classroom setting where trust, choices, and adequate time are key factors in planning and implementing a reading program.

Case 2 - Kevin

Teacher Observation

Prior to mid-term examinations, Kevin's teacher submitted the following report to a psychologist recommending that Kevin be tested for learning disabilities:

> Kevin is a very pleasant, cooperative, and communicative child. He is always eager to please and participate in class activities. He is very responsible concerning follow-through in matters of homework and other directions. He enjoys a wide variety of activities.
> Kevin has experienced difficulty in letter-sound recognition and other reading decoding skills. Substitutions and reversals are common. These weaknesses handicap him in other subject areas.... Techniques that have been helpful are underlining sentences with a bookmark during reading, spelling by letter those words that are difficult, individually administering tests so that he reads each word and working with other students in a cooperative learning situation....
> There are some difficulties in coordination, especially in small muscles. He is left-handed. Cutting and penmanship can be frustrating for Kevin. Kevin has a lot of self-confidence in a secure and positive environment. We would like to know more about the specific nature of his learning difficulties so that we can do more to assure his success.

Further discussion revealed that Kevin's teacher felt he needed individualized instruction. She stated that Kevin's skills were weak and his concentration was poor. She

described his oral reading as halting and indicated that his very weak phonetic analysis was reflected in his comprehension. She recommended that Kevin receive reading instruction through the Chapter I remedial program.

Remedial Reading Instruction

In the first few weeks of remedial reading instruction, it was noted that Kevin needed a quiet environment to concentrate. He preferred to read in a well lit area and needed a cool environment. He was extremely uncomfortable in a warm room. Kevin was teacher-motivated and preferred reading with an adult. He chose to read by himself rather than with other students if an adult could not be present. Although the classroom teacher described him as responsible, Kevin found it difficult to complete lengthy assignments. He would easily become frustrated with assignments that involved much writing. When Kevin knew he would be able to transfer written assignments to the computer, however, he was more motivated to complete the assignment.

Kevin needed structure. If there were many choices for an assignment, it was difficult for him to choose. Kevin needed to talk through an assignment before beginning the task. He was very verbal. On occasion, Kevin would bring an object to class and would give an oral presentation to his classmates. Kevin would usually be the first student to answer a question that was asked, provided he didn't have to read the question.

Kevin had strong leanings toward auditory learning. He remembered directions and stories after hearing them once. He could still relate the details of a story several days after he read the selection. The stories he composed often included details from stories he had read or heard.

He experienced difficulty in decoding words that looked alike and would make errors in oral reading by reversing letters within a word. The word left became felt, and the word road became rock. Kevin would also substitute words with words of similar meanings such as reading the word lad as boy. Psychological testing revealed that Kevin was not dyslexic, but his reversals and substitutions indicated that he needed to concentrate on the passages read in order to improve oral reading. It was also noted by the psychologist that Kevin's ability to substitute words with similar meanings was a result of his extensive speaking vocabulary.

Kevin's preferred learning modality was tactile/kinesthetic. He enjoyed and benefitted from reading games, model building, project work, and multisensory activities. Like Lisa, he had difficulty completing workbook pages. Because of his limited fine motor coordination, Kevin struggled with written assignments. When Kevin was permitted to prewrite a story through a project or activity, the results were more beneficial. The combination of creating an activity and speaking about the activity, was most beneficial for Kevin. Kevin enjoyed

using the games that were part of the remedial reading instruction. It was evident that once Kevin found he was able to enjoy learning through a hands-on activity, he became more persistent and continued using the materials until he had mastered the objective of the activity. As the reading classes continued, Kevin started creating his own games and activities that could be used by the members of the reading group.

Because Kevin was teacher oriented, he wanted to please. He would express concern about completing a task correctly so that his classroom teacher would not be upset with him. This concern was expressed several times at the beginning of the remedial reading class. He would become anxious about completing the reading session because he had to finish other work when he returned to his regular classroom.

During the week of final examinations, Kevin became extremely anxious. He said he was sick during his religion exam and was unable to complete the five page test. When questioned about the test, Kevin responded that there were too many pages to complete. He also mentioned that he did not like his classroom teacher making him complete his test sitting next to her. Arrangements were made with the classroom teacher to permit Kevin to take the same religion examination in the remedial reading classroom at another time during the day. After the regular reading class, Kevin

remained in the classroom to complete the exam. Kevin orally read the exam and wrote the answers on the test paper. Although there were a few words on the test that he could not read, he received limited assistance from his reading teacher. Kevin's final score of 98% indicated he knew the material on the test, but unlike Lisa, Kevin's confidence did not carry over to the regular classroom. In fact, during the week of final examinations, Kevin expressed anxiety and reluctance about coming to school. His mother reported that Kevin cried every day that week because he was afraid his teacher would yell at him if he made a mistake on the examination. Kevin also expressed concern about being held back in second grade.

Evalaution

In working with Kevin in remedial reading classes for five months, it was determined that his reading problems were increased by the brain antagonistic setting of the regular classroom. As soon as Kevin experienced threat in the regular classroom setting, he became unable to perform. Kevin needed to be able to move freely about the classroom and not be confined to an assigned seat. Kevin needed the assurance that he was learning. In the classroom, where every workbook page or worksheet was graded, he became more anxious because in most cases he was not able to complete the written work in the given time. For Kevin, achievement needed to be recorded, not failures. As a student in a

conventional classroom with competitive marking and grading, Kevin was not able to achieve success. He and others like him may easily come to have a low self-image and regard education negatively putting these students at risk for academic failure.

Because of Kevin's strong verbal ability, he needed opportunities to talk about what he was doing. He needed the opportunities to speak to the other members of his group as they worked on group projects; he needed to feel confident enough to ask the teacher for direction and guidance without the threat of being scolded for talking. To be effective, Kevin needed two way communication. If writing was to be used as a major form of communication for him, he needed to receive something in exchange for his written message. When Kevin received a letter from the New England Aquarium responding to his questions about Andre, the seal, his response was: "This is the first time I ever got a letter! I'm going to ask my Mom if we can visit there this summer."

Kevin learned quickly from the things he heard and saw, and therefore benefitted from interacting with people, using many materials, and linking his learning to real life situations.

The test results of the reading program indicate Kevin's progress. Of the three members of the group, Kevin showed the greatest improvement. In addition to higher test

scores, Kevin also had a greater consistency in his grades. When Kevin took the reading skills test from Scholastic News (1990), he correctly answered 35 of the 38 items. His grade for his final exam in Language Arts was 93%, ranking him in the top half of his class.

In addition to the measurable results of the remedial reading program, Kevin also developed a disposition of interest in reading. His mother reported that he was now reading cereal boxes as he ate his breakfast in the morning. She also stated that he read signs on the road as they were traveling. Kevin also became interested in collecting books. He would often bring to class a new book he received and share with his classmates the details of the story.

His disposition of interest in reading was enhanced by his competence in communicating. Kevin engaged in conversation when something of interest occurred to him. The books he was reading provided a meaningful context for him to share his interests with others.

Recommendations

As Kevin moves into third grade, it is recommended that he be permitted to continue learning through multisensory materials. Kevin needs a positive and non-threatening environment where he will be encouraged to take risks without the fear of failure. He must be able to talk and communicate with others if profitable learning is to continue. Specific positive feedback is essential for him.

Kevin needs to know how well he is doing so that his interest in a project will be strengthed. A comment of "very good" or a reward of a gold star may satisfy his need for reward, but the specific comment that requires Kevin to respond will continue to develop in him a disposition of interest.

Kevin's teachers will need to take time to listen to him. Kevin's communication skills will more fully develop when he engages in conversations with adults and other children. Conversation will strengthen his oral and written expression. It will also strengthen his reasoning skills as he learns to respond to each participant in the conversation.

Kevin's teachers will also need to provide alternate means for him to complete written exercises. Kevin should be encouraged to continue using the computer for writing and editing his stories. Using a tape recorder to take tests would benefit Kevin, and most likely give a clearer indication of what he actually knows.

Reading improvement will continue for Kevin when he is able to succeed in a classroom that provides the trust, choice, and time he needs.

Case 3 - Jessica

Teacher Observation

As a result of failing the mid-term examination in Language Arts, and because Jessica was also on the same level in reading as Lisa and Kevin, it was decided that Jessica would begin remedial reading instruction with the other two students. Her classroom teacher did not feel that Jessica had as many difficulties in reading as the other two students in the group. She had been in that reading group since first grade and was never able to achieve the grade level of the other 17 students in the class.

The classroom teacher indicated that Jessica's decoding skills were weak, but she also noted that Jessica attempted to apply the decoding skills in her oral reading. Her analysis of the reading material was superficial and she was described as jumping to conclusions without much thought. Her classroom teacher stated that she completed her work and seemed to be making adequate progress at this level. There was no indication by the classroom teacher that Jessica was experiencing difficulty in other subject areas. The teacher was satisfied with Jessica's progress.

Remedial Reading Instruction

During the first few weeks of remedial reading classes, the informal learning style analysis indicated that Jessica was a tactile/kinesthetic learner. She was restless during the reading instruction and would often stand for part of the class time. She was easily distracted by noises and

found it hard to concentrate if the room was not warm. When she was given the choice of where she wanted to read in the remedial reading classroom, she would usually sit on the floor in a corner of the room.

In the sharing sessions at the beginning of each class, Jessica was hesitant to speak. Jessica could be brought into the conversation when she was asked direct questions such as, "Jessica, can you tell us about the time you lost your first tooth." Although she would not usually initiate the conversation, she would contribute once she felt she had something to share.

When reading instruction began, she would often ask if she had to do oral reading that day. She stated that she would rather listen to others read. When she was allowed to make this choice, she often took her turn in oral reading anyway. It was noted that Jessica wanted to be a part of the class, and even though she may have stated that she did not want to participate, most times she chose to participate.

Lengthy stories discouraged her, as did lengthy assignments. She greatly disliked the level tests because she stated they were too long. It was noted in almost all of Jessica's tests, that her errors most often occurred

toward the end of the test. She usually had a strong beginning, but then she tired as the test progressed.

Jessica preferred to work with the group instead of completing assignments on her own. When assignments and projects were given to be completed independently, Jessica often did not complete the project or did the minimum of work on the project. Her story on hurricanes is an example:

A Hurricane

The hurricane killed seven people in New York. The hurricane killed ten people in Texas.

Although this story gives a complete idea, it is very brief for this grade level. Jessica frequently used the excuse she did not have time to finish the work, although the other two students had completed the assigned tasks.

During class time, Jessica frequently asked when class would be finished. She, like the other two students, disliked working in the reading workbook. Many days she would ask, "Do we have to do Skillpack today?" If the workbook was assigned, she would ask if the group could work together. For Jessica, group work seemed to be most beneficial. She seemed to be more persistent in completing assignments if the group could work together.

Jessica experienced the most difficulty in reading comprehension. She struggled with new concepts such as sequencing, drawing conclusions, and identifying cause and effect. When real books were used with Jessica, she seemed to grasp these concepts more quickly.

Evaluation

As the year progressed, Jessica showed some signs of improvement. Jessica was given more individual attention while the other students worked independently on projects. At first, this approach was not effective, and Jessica would resist any extra help. She would often guess at answers rather than take the time to work at the solution. On one unit test, she completed a section of the test very quickly with many errors. However, when she was asked to read aloud the sentences she had just completed, she verbally corrected all her written errors without any prompting from the teacher. It was through individual sessions such as these that Jessica revealed how much material she actually knew.

Jessica took the reading skills test from Scholastic News (1990) with the rest of her classmates in May. Jessica correctly answered 24 of the 38 test items. She had the lowest score in the class and was the only student who did not receive a passing grade on the test. Upon further investigation of the test, it was noted that most of Jessica's errors occurred toward the end of each section of the test. The classroom teacher explained that the test was given during one class period and the students were required to finish the test in the given time period. Jessica's errors reflected her repeated pattern of fatigue on long assignments.

The same pattern was not followed in Jessica's final exam in Language Arts. Jessica scored an 87% on the

examination, a definte improvement over the 68% she received on the mid-term examination in this subject.

Although Jessica's test scores do not clearly indicate whether the remedial reading program using brain compatible techniques was effective for her, there are other indications that the program was beneficial for Jessica. As the reading classes continued, it became more evident that Jessica lacked many life experiences. Whereas the other two students were familiar with experiences such as making cookies, or understood what was in an aquarium, Jessica did not have these experiences. It was beneficial for her to be exposed to the shared experiences of Lisa and Kevin.

Jessica learned other dispositions from her two classmates. Their sharing of experiences helped create a disposition of curiosity and interest in Jessica. She began asking questions and started sharing her own ideas. She developed an interest in reading books and even requested keeping Beverly Cleary's book Ramona the Pest after the school library closed so she could finish reading the story. During the summer she wrote a letter on her computer and said, "I read Addie Runs Away. That was my favorite book. I miss you and I miss Lisa and Kevin...."

Although Jessica's tests scores showed continued inconsistencies, the dispositions she developed during the five months of remedial reading indicate the program benefitted Jessica in ways not measured by test scores.

Recommendations

As Jessica begins third grade, it will be beneficial for her to become involved in group activitites. Jessica needs to interact with other people, especially with her peers. It is suggested that she be given opportunities to experience life situations. She would benefit from field trip experiences. Joining a group such as the Brownies would provide group interaction as well as exposure to real life situations.

Jessica's teachers will need to provide her with tactile/kinesthetic learning experiences. Her teachers will need to provide necessary background information for stories Jessica will read. When teaching Jessica new skills, her teachers need to relate the skills to real life situations Jessica has experienced. She will benefit from specific positive praise such as "Jessica, I like your story about your trip to the zoo. Can you tell us about your favorite animal?" She will need to know how she is doing well in order to develop the disposition of persistence in a task. Engaging Jessica in conversation will assist her in developing effective communication skills.

In the conventional classroom, Jessica may appear unmotivated and in need of remediation when she actually needs interaction with many people. She needs to develop a sense of confidence in her own abilities. She has the dispostion to learn skills; she needs opportunities to use the skills learned in a practical way.

CHAPTER FOUR

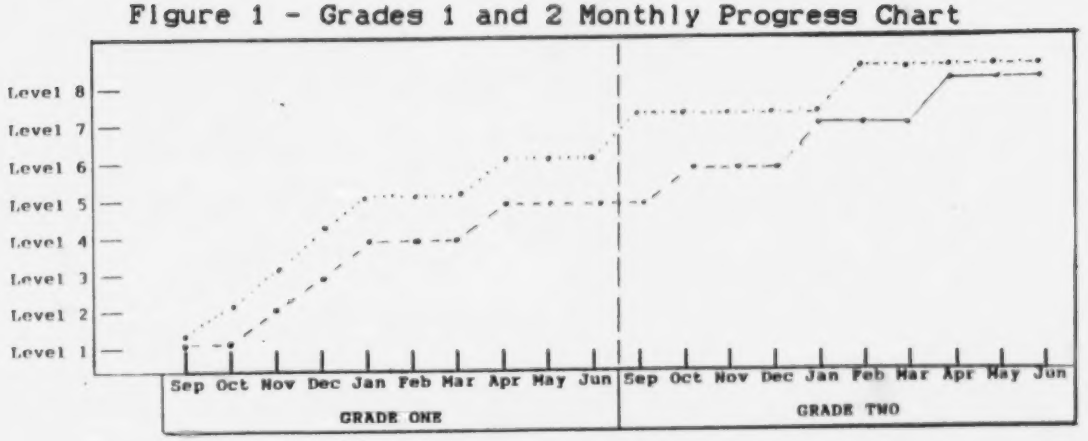
Analysis of the Results of the Investigation

This study was undertaken to determine whether a pattern of continuing failure in reading for three remedial students could be changed and the students brought to grade level as measured by The Ginn Reading Program (1985), when taught with brain compatible techniques.

Three students were identified as at high risk of failing to achieve the goals and objectives of the Ginn basal reading series in use for reading instruction in the second grade. The three at-risk students were reading at the first grade level while the other 17 students in the second grade were reading at grade level as measured by the Ginn series. These three students began instruction in the second grade level, Level 7, in January of second grade. A remediation program using brain compatible techniques began in February with the three at-risk students with the hope of having all three students reading at grade level within the five remaining months of second grade.

Figure 1 represents the progress made by the three remedial students and the other 17 students in the class in first and second grade. The first grade level of the Ginn series includes six separate reading books. Each book is considered a level. Within the levels, there are subdivisions known as units. The second grade level of the series includes two books, Levels 7 and 8, with four units in each level.

Figure 1 - Grades 1 and 2 Monthly Progress Chart



- - - Remedial Group - First Grade Material

——— Remedial Group - Second Grade Material

..... On-Level Group - First Grade Material

.-.-. On Level Group - Second Grade Material

The 17 on-level students were able to complete the six levels of the first grade requirements in the ten months of first grade. They completed Level 7 of the second grade program in January of second grade, and in the five remaining months in second grade they completed Level 8.

The remedial group completed the first grade material in 14 months. In January of second grade they began Level 7, the first book of the second grade level. When they began the remediation program in February, they were starting the second unit of Level 7. These students in the remedial reading program were able to complete each level of the second grade program in three months. Within the five months of the remediation program, they completed Levels 7 and 8 and were on grade level with the other 17 students in their class. This figure shows that these three students were able to accomplish in six months what their 17

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classmates achieved in the ten months of regular instruction in second grade. The remediation program using brain compatible techniques for the three students at-risk enabled them to reach grade level within the five months of the program.

The Ginn Reading Program (1985), evaluates student progress through unit and level tests throughout the program. The results of these tests for Lisa, Kevin, and Jessica are presented graphically in Figures 2 - 13. Each graph indicates the percent of correct responses on the level tests. There are four graphs for each student indicating test results in a) vocabulary, b) comprehension, c) decoding, and d) total test scores for each of the levels and units recorded. The levels and units are indicated at the bottom of the figure. Beginning with Level 5, the subdivisions of the units are included. (For example, Level 5-3 indicates that this is the third unit of Level 5.) When the level number appears by itself on the graph (i.e., Level 5), that represents the cumulative test for that particular level. Each level contained four unit tests and a cumulative test.

The broken line on the graphs represents the levels completed by these three remedial students in first grade. The graph shows that these three students completed only four of the six levels designated as first grade material by The Ginn Reading Program (1985). The remaining portion of

the first grade material, Levels 5 and 6, were completed in the first four months of second grade. (Refer to Figure 1 for the monthly progress of the students in first and second grade.) The second grade material, Levels 7-1 - 8-4, was completed by the students in the remaining six months of second grade. The solid line in the graphs indicate the levels completed by the students while in the second grade.

The vertical dashed line on the graph separates the graph into the levels completed before remediation and the levels completed during remediation. The dotted line running horizontally at the 80% division indicates the suggested passing score by the Ginn series for the level and unit tests.

It should be noted from the graph that it took these three remedial students the first four months of second grade to complete first grade material. When the students began remediation in February of second grade, they were starting Level 7-2. The graph shows that the three remedial students were able to complete the entire second grade material of Levels 7 and 8 with brain compatible instruction in six months, whereas it had taken them the ten months of first grade plus the first four months of second grade to complete the first grade material.

Figure 2 - Lisa's Vocabulary Scores

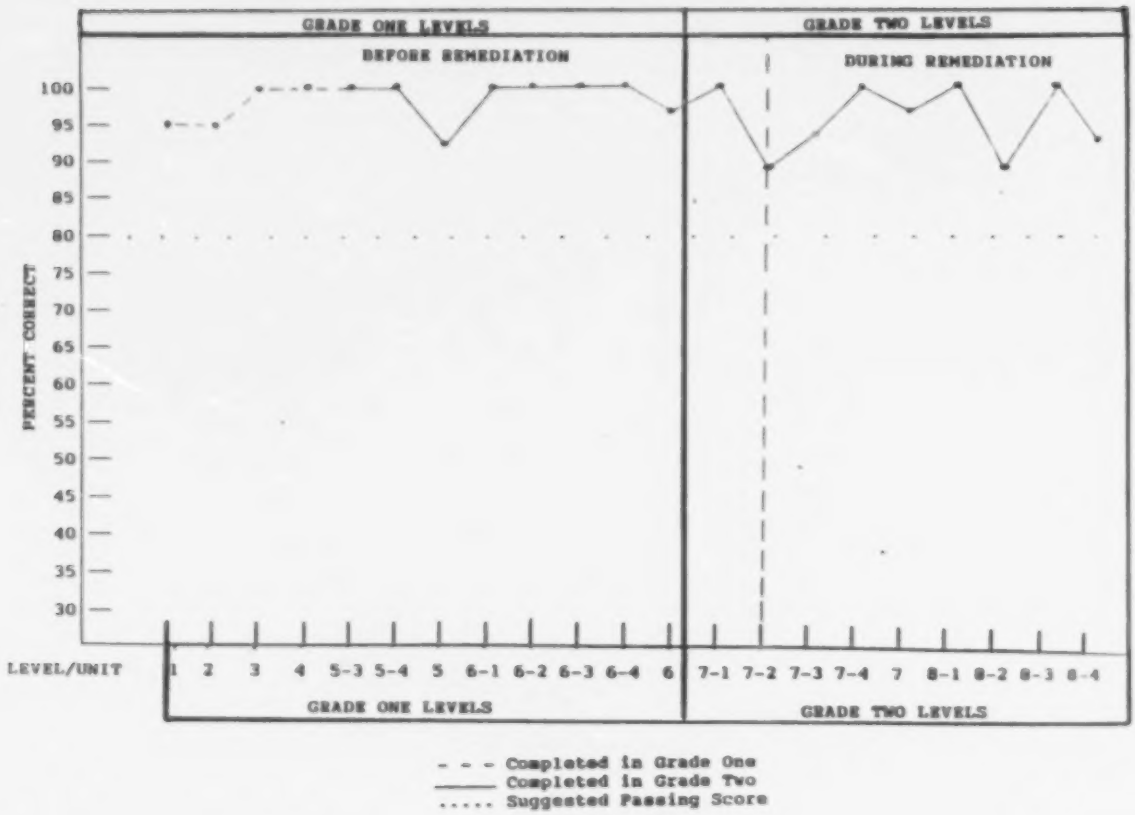

Figure 2 represents Lisa's vocabulary scores in grades one and two. These test results indicate Lisa's strength in vocabulary. Lisa's scores were consistent in both first and second grade. She had a high level of achievement even before she began the remediation program. The graph reveals there was more consistency in her grades before the remedial program. Although brain compatible instruction did not contribute to higher or more consistent scores in vocabulary, her scores still indicate a high level of

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achievement with the lowest score on the Level 8-2 test at 89%.

Figure 3 - Lisa's Comprehension Scores

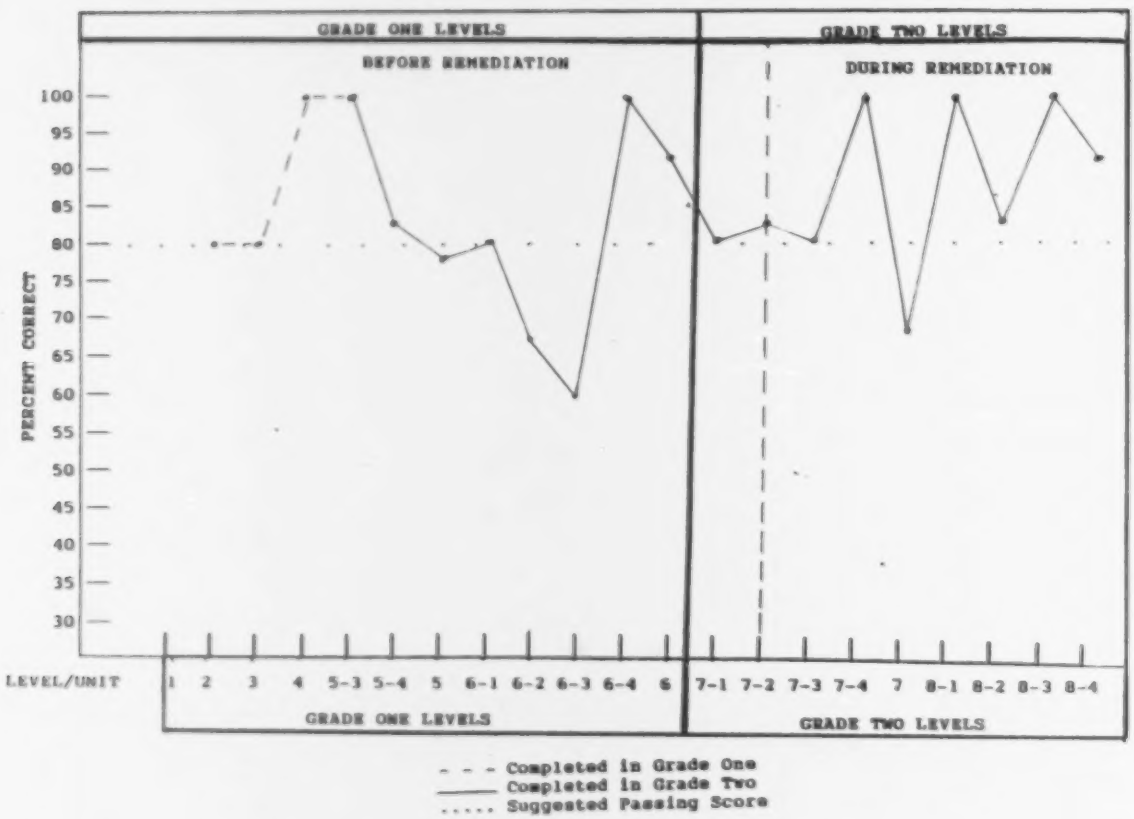

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Figure 3 represents Lisa's scores in comprehension during first and second grade. The graph indicates that while Lisa was in first grade, her comprehension scores were consistent and within the suggested passing score of 80% as measured by the Ginn series. Her comprehension scores were very inconsistent during the months in second grade prior to receiving brain compatible instruction. Levels 5, 6-2, and 6-3 reveal she was below the suggested passing score of 80%. In Level 6-4 she achieved 100%, and then her scores gradually declined again. However, she was able to stay within the suggested passing range. When Lisa began the remediation program, her test scores were above the suggested passing score of 80%, with the exception of her Level 7 test score of 67%. Throughout Level 8, Lisa maintained passing scores and completed the remediation program with a score of 92% on the Level 8-4 test.

The remediation program with brain compatible techniques enabled Lisa to show some improvement in comprehension. All of the test results for Level 8 indicate Lisa benefitted from the remedial instruction and was able to achieve grade level by June of second grade.

Figure 4 - Lisa's Decoding Scores

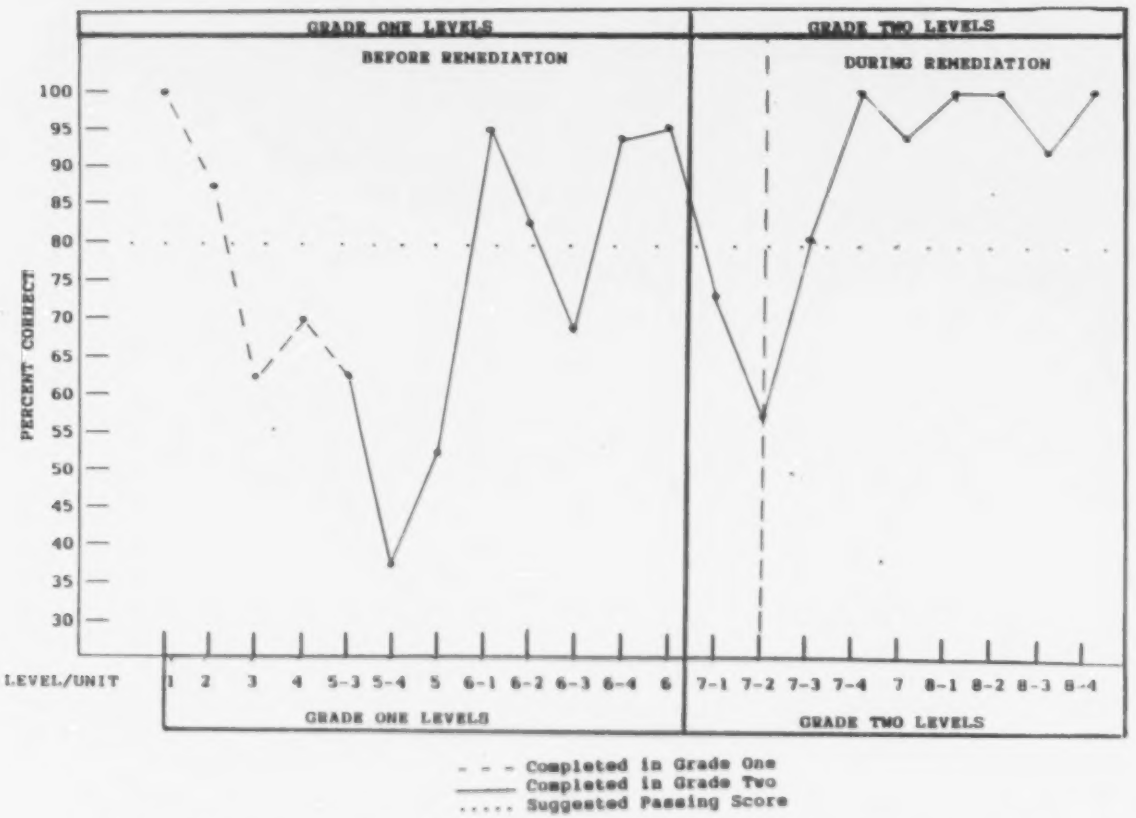

Figure 4 records Lisa's decoding scores in first and second grade. The graph indicates Lisa's difficulty with decoding in first grade. Her scores in this area are inconsistent, and more than half the scores before receiving remediation were below the suggested passing score by 10 to 40 percent.

Lisa's achievement in decoding during the time she was in the remedial program is indicated by her scores moving from the failing range to the suggested passing score of 80% in the Level 7-3 test. Beginning with the Level 7-4 test,

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her scores were in the 90% range and she maintained this high range throughout the remedial program.

Before brain compatible instruction, decoding was Lisa's weakest area. As a result of brain compatible instruction, decoding became Lisa's strongest area.

Figure 5 - Lisa's Total Scores

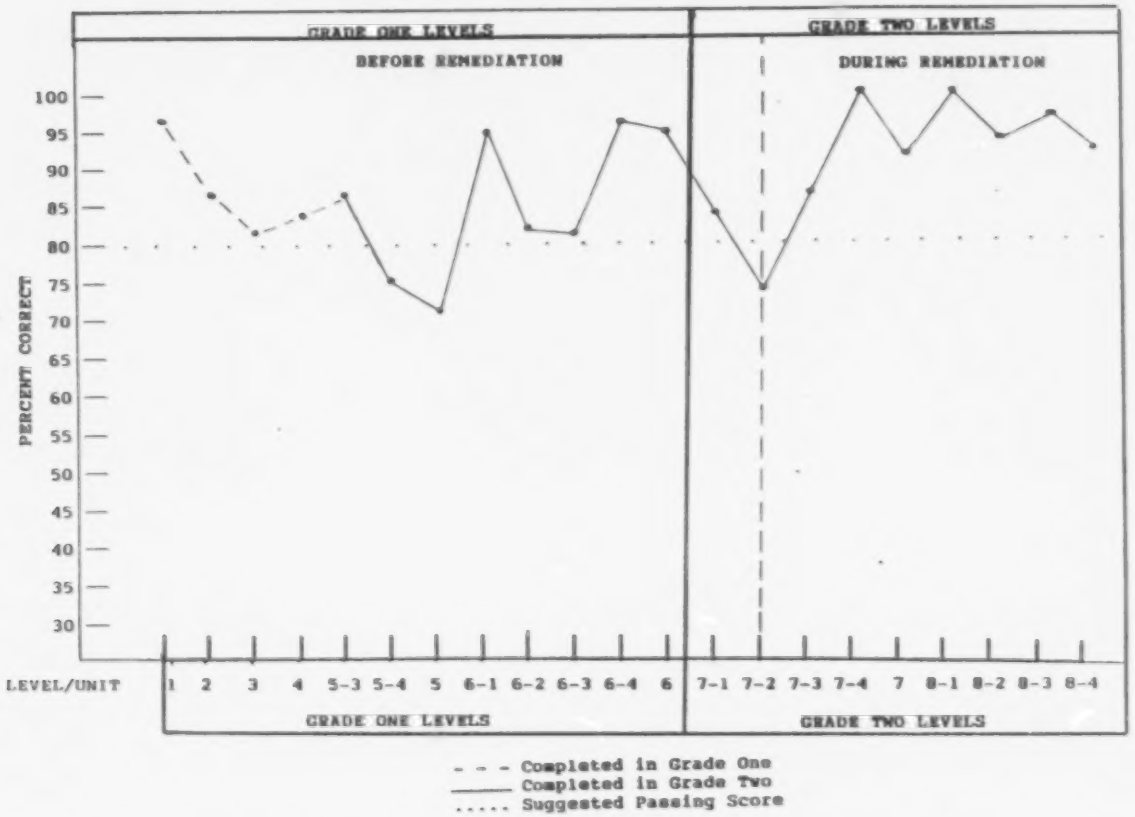

Figure 5 shows Lisa's total test scores. The graph shows Lisa was able to maintain the suggested passing score of 80% throughout first grade. In second grade she scored below this reference point on the Level 5-4 unit test and on the Level 5 cumulative test. In the remaining months in

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second grade, prior to remedial instruction, Lisa maintained passing grades with the exception of the 74% she received on the Level 7-2 test.

During the remediation program, Lisa demonstrated consistent progress. Beginning with Level 7-4, and on every unit and level test after that, she maintained an average score of 90% or higher. This graph indicates that brain compatible instruction was effective for Lisa in achieving higher grades and in maintaining consistent progress.

Figure 6 - Kevin's Vocabulary Scores

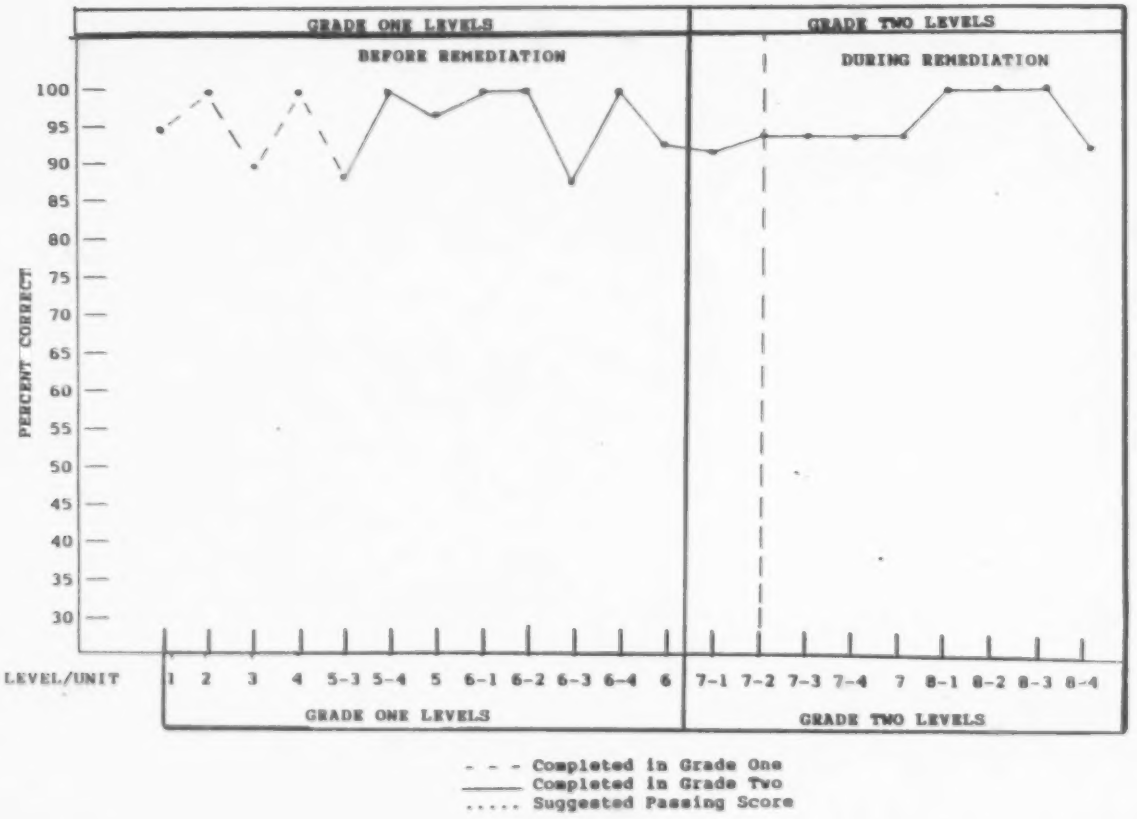

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Figure 6 presents Kevin's vocabulary scores in first and second grade. The graph reveals Kevin's strength in this area before and during remediation. In first grade and in the months prior to receiving remedial instruction in second grade, Kevin showed high achievement in vocabulary.

When Kevin began the remediation program in Level 7-2, he continued his high scores in vocabulary. Brain compatible instruction did not improve Kevin's vocabulary scores. All scores during the remediation program remained in the 90% range.

Figure 7 - Kevin's Comprehension Scores

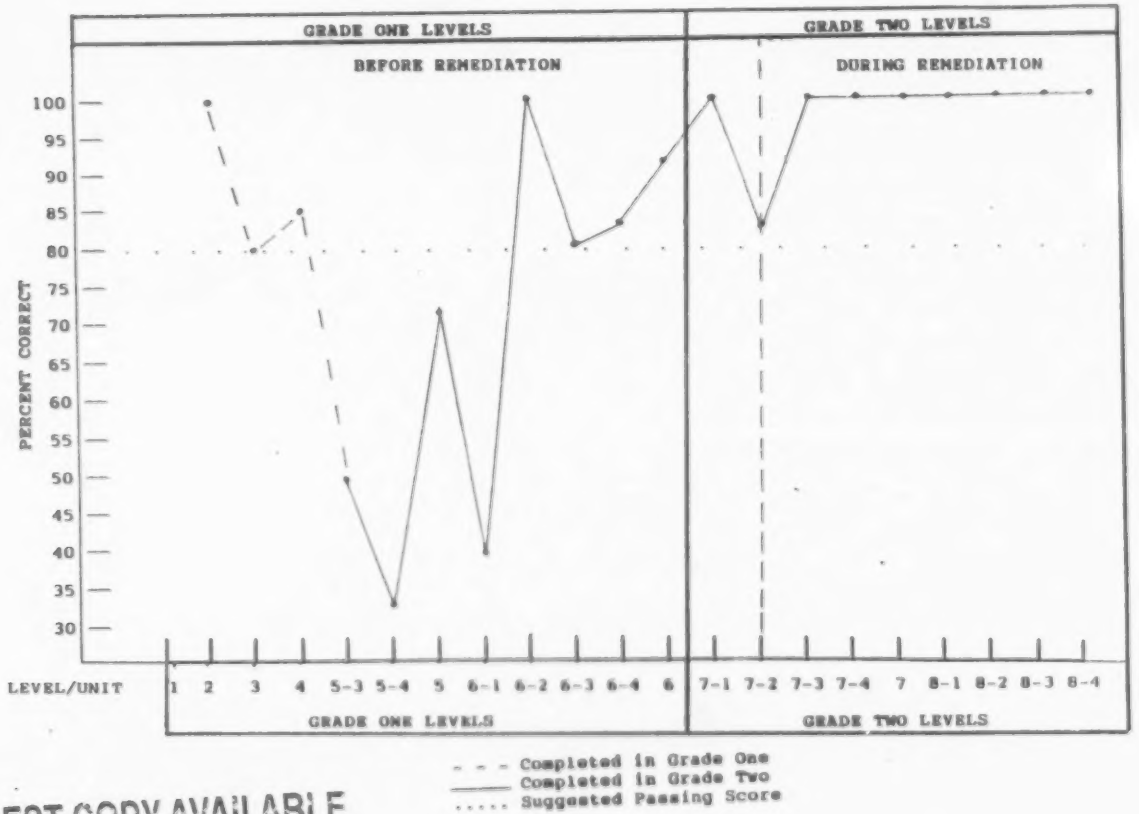

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Figure 7 records Kevin's comprehension scores during first and second grade. Kevin's difficulties in comprehension were already evident in second grade on the Level 5-3 test. Kevin's scores throughout second grade before receiving remedial reading instruction were very irregular. Levels 5-3, 5-4, and 6-1 indicate very low grades. Beginning with Level 6-2, he again achieved the suggested passing score of 80%.

While Kevin was in the remedial reading program, there was noticable improvement in his comprehension scores. His score on the Level 7-2 test of 82% was the lowest grade during remediation. Every test score after Level 7-2, Kevin scored 100%. It is obvious that brain compatible instruction helped Kevin improve his comprehension scores.

Figure 8 - Kevin's Decoding Scores

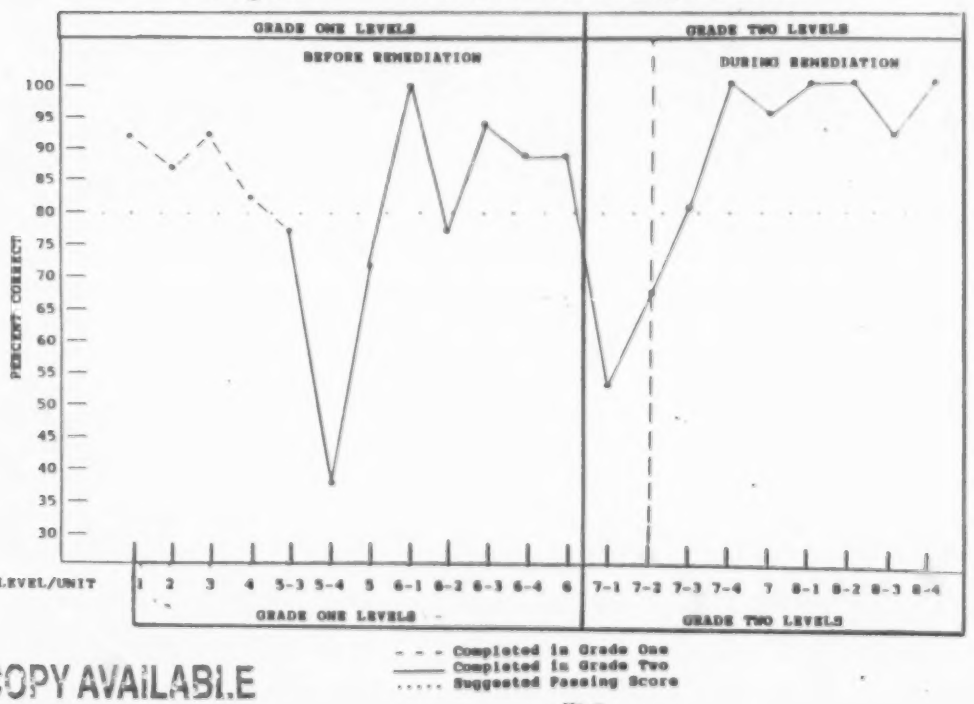

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Figure 8 represents Kevin's decoding scores. In first grade, Kevin was able to achieve a passing score on all the decoding tests. Before he began remediation in second grade, he started experiencing difficulty in this area. More than half of Kevin's scores were below the suggested passing score of 80% at that time. Kevin was also very inconsistent with his scores. On the Level 6 test he scored 90% in decoding. On the next test, Level 7-1, he scored 53%.

Kevin showed great progress as he received instruction in the remedial program. His test grade of 68% on the Level 7-2 test climbed to 83% on the Level 7-3 test, and continued climbing to 100% on the Level 7-4 test. Throughout Level 8, Kevin maintained scores of 90% or higher in his decoding tests. Brain compatalble techniques helped Kevin to achieve higher grades in decoding.

Figure 9 - Kevin's Total Scores

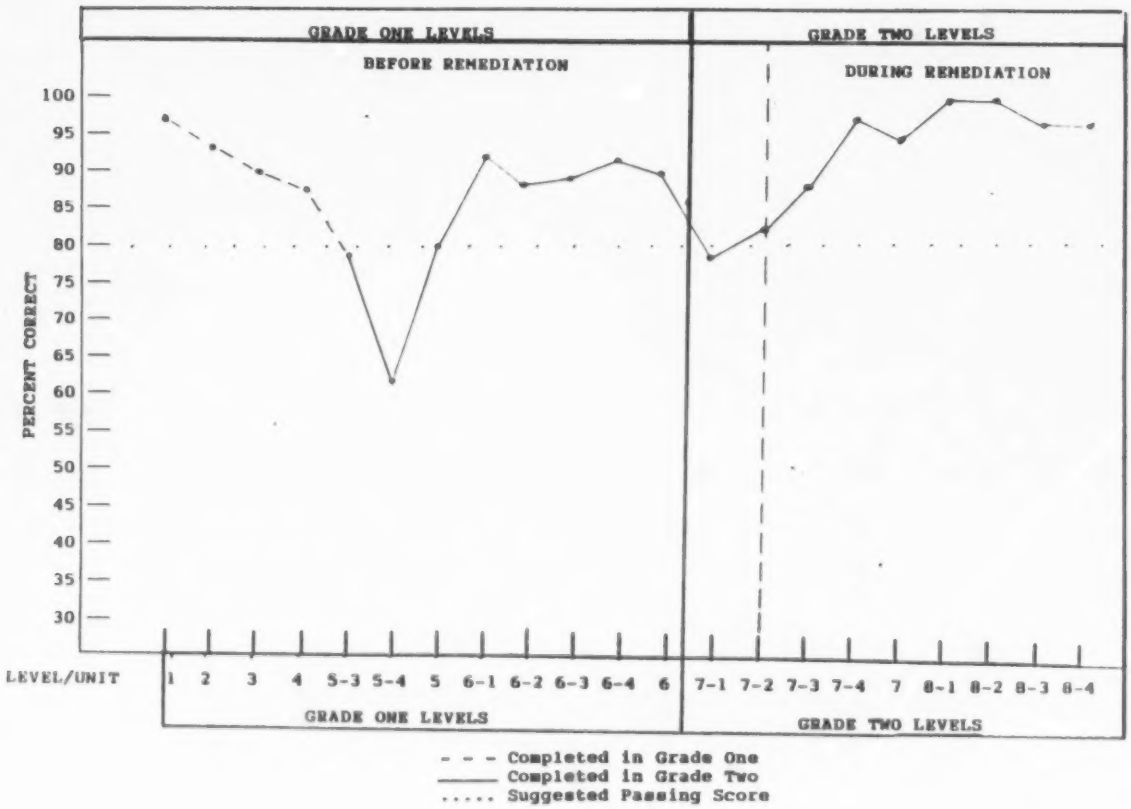

Figure 9 represents Kevin's total test scores in first and second grade. Throughout first grade, Kevin maintained passing scores of 80% or higher in his total scores. Before entering the remedial program in second grade, Kevin had some difficulties in Levels 5-3 and 5-4. Beginning with Level 6-1, Kevin maintained passing scores and showed some consistency in his test grades. His grades ranged in the 80's and low 90's.

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During remediation Kevin scored in the high 80's on the Level 7-2 and Level 7-3 tests. Kevin moved into scores of 95% and higher in all the levels beyond 7-3.

These graphs not only indicated higher grades for Kevin in one area, but he was able to achieve higher grades in every area of the program as a result of brain compatible instruction.

Figure 10 - Jessica's Vocabulary Scores

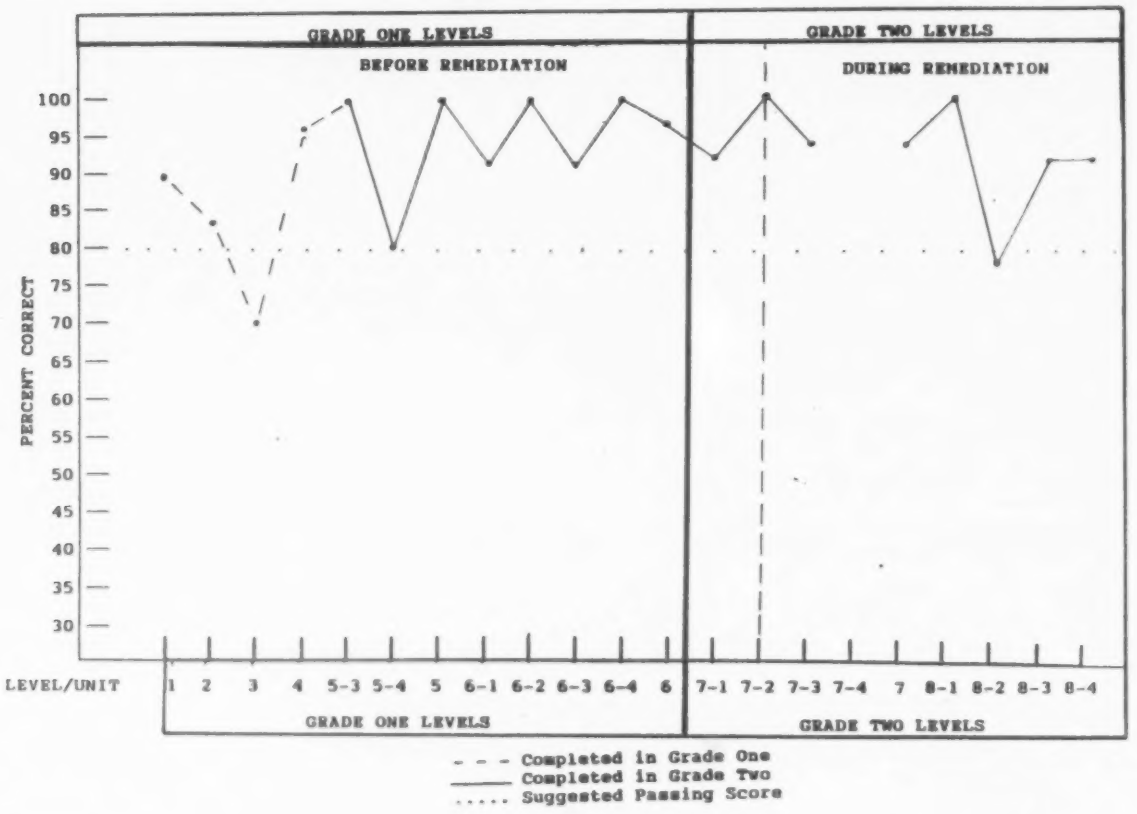

Figure 10 represents Jessica's vocabulary scores in first and second grade. The graph indicates Jessica was

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already having difficulties in vocabulary in Level 3 of first grade. Her scores in first grade were inconsistent. In Level 3, she was below the suggested passing score of 80%, and then in the next test, Level 4, she scored 95%. Before Jessica received remediation in second grade, her vocabulary scores improved. Most of her test grades were 90% or higher.

When Jessica began the remediation program, she was able to maintain scores of 90% and higher in vocabulary. Jessica was not able to maintain the high scores on the Level 8-2 test. Jessica improved again on the last two tests of Level 8 with scores in the high 80's.

There is no score given for Jessica for the Level 7-4 test. She was absent at the time the other two students took this test and she asked to be excused from the test when she returned to school.

Brain compatible instruction did not help Jessica in vocabulary. The graph indicates that Jessica had lower grades during the remediation process, and her grades were less consistent than they had been during the time in second grade prior to remediation.

Figure 11 - Jessica's Comprehension Scores

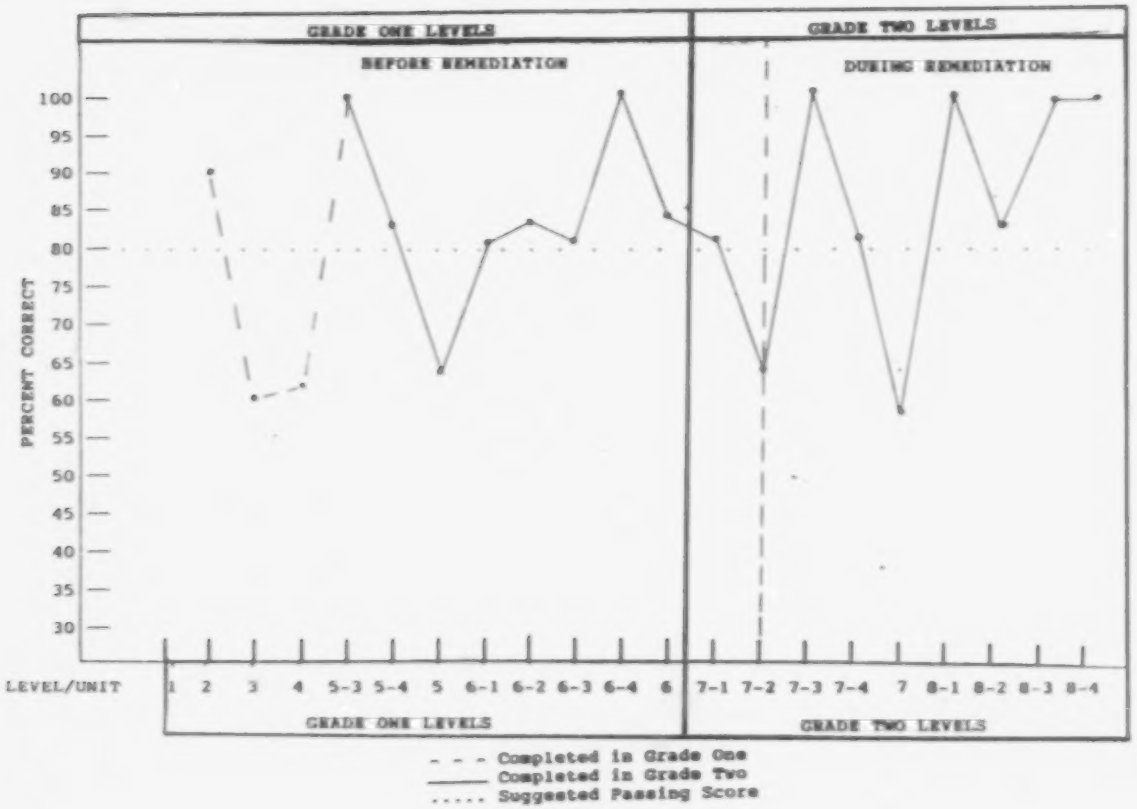

Figure 11 shows that Jessica's scores in comprehension were always inconsistent. Since Level 2 does not include a comprehension section of the test, no score is given. The other three scores from first grade indicate one passing grade and two failing grades. Although Jessica failed the Level 5 test in second grade, there were no other failing grades during the time in second grade before remediation began. However, Jessica's scores remained inconsistent throughout second grade, before and during remediation.

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When Jessica began the remediation program, her first test score from Level 7-2 was also below the suggested passing score of 80%. During the remediation period she failed the Level 7 test. A few days before the test, Jessica had been absent because of illness. On the day she returned to school, Lisa and Kevin were taking the Level 7 test in comprehension. Although Jessica was advised to postpone the test for a few days, she wanted to take the test at the same time the other students took it. The failing grade was the result of the test.

The other test grades during remediation were above the suggested passing score, and Levels 7-3, 8-1, 8-3, and 8-4 results were 100%. Although it is not definite that brain compatible instruction benefitted Jessica throughout the remediation program, the results of this graph indicate that there was some improvement in her test grades during the program.

Figure 12 - Jessica's Decoding Scores

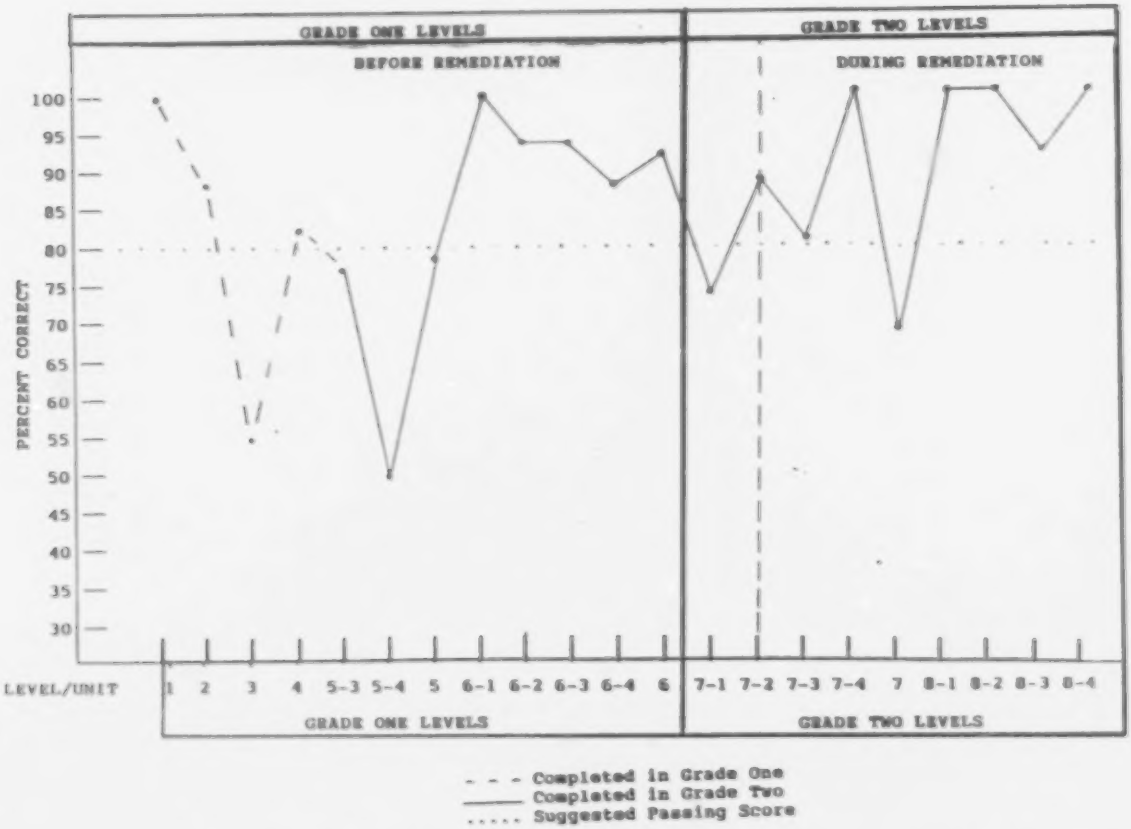

Figure 12 represents Jessica's decoding scores during first and second grade. Jessica began first grade with high scores in decoding, but by Level 3 she was failing. In Level 4, she again achieved a passing score. During the months in second grade before remediation, Jessica scored below the suggested passing score of 80% on Levels 5-3, 5-4, and 5. As she progressed in Level 6, her scores were high again. Level 7-1 found her below the passing score once again.

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This pattern was repeated as she moved into the remediation program. Levels 7-2 and 7-3 revealed passing grades, but on Level 7-4 she scored 69%. From that point on, however, her test scores were 100's and a 93% on Level 8-3.

Jessica's scores in decoding were still inconsistent during instruction with brain compatible techniques. However, most of her test scores reveal higher scores as a result of the remedial program.

Figure 13 - Jessica's Total Scores

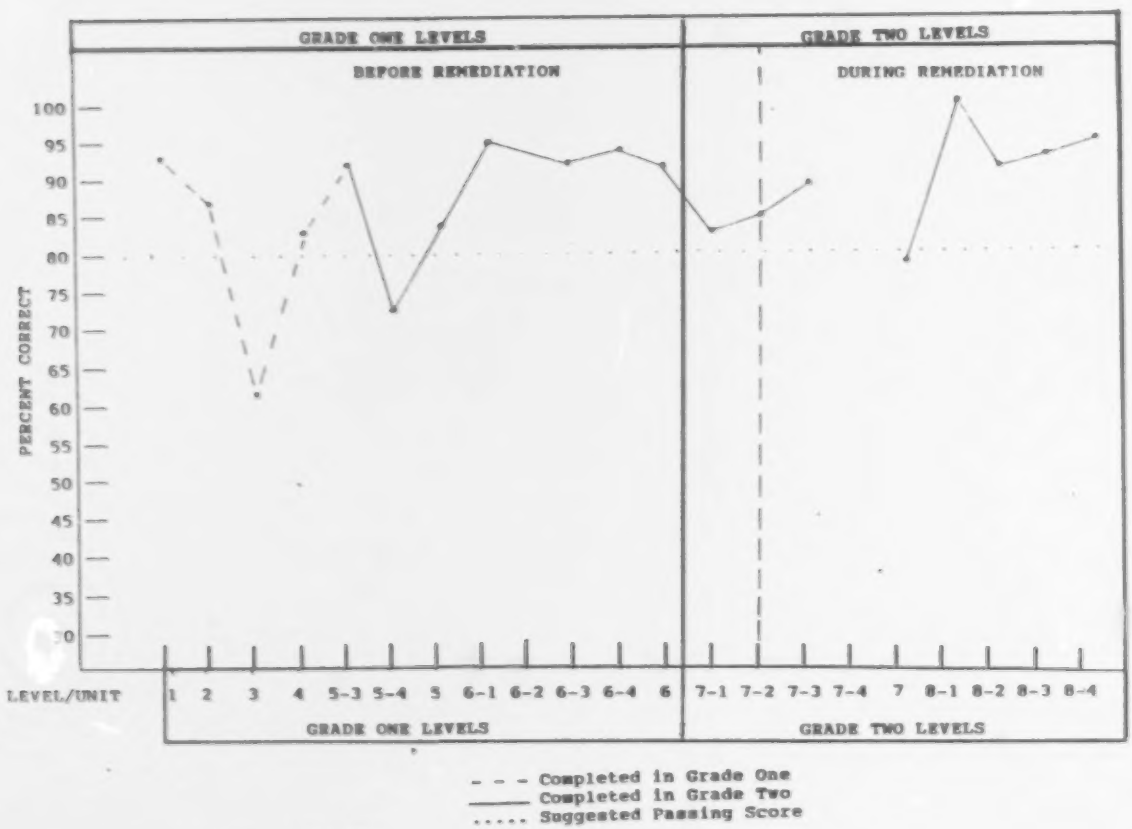

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Figure 13 presents Jessica's total test scores. The inconsistent pattern is noted again in her achievement in first grade. In second grade before she began the remediation program, there was more consistency in her test scores. Level 6 cumulative test and the unit tests for that level show more consistent grades than at any other time in first or second grade.

The results of her scores during the remediation program show grades of 85% or higher, with the exception of the Level 7 test. There is no score given for Level 7-4 becasue Jessica did not complete the entire test because of illness.

Brain compatible instruction for Jessica helped her in some areas of reading. There was noted improvement in test scores in the comprehension and decoding areas. Jessica did not reach a consistent level of achievement as a result of brain compatible instruction. However, she was able to reach grade level in reading by the end of the remedial program.

CHAPTER FIVE

Summary, Conclusions, and Recommendations

Summary

This study was undertaken to determine whether a pattern of continuing failure in reading for three remedial students could be changed and the students be brought to grade level as measured by The Ginn Reading Program (1985), when taught with brain compatible techniques. It was hypothesized that the use of brain compatible techniques used for remediation would be effective instruction for all three members of the remedial reading group; that the three members of the remedial reading group would achieve the skills and objectives of the Ginn basal reading series when taught with brain compatible techniques; that the use of brain compatible techniques used for remediation would strengthen the dispositions of interest, effort, and mastery toward reading in the three members of the remedial group.

The subjects of the study were three second graders who at the end of the first semester, were identified as needing remediation as a result of failing the mid-term cumulative examination in Language Arts. At the time of the midterms, January of second grade, these students were still receiving reading instruction on the first grade reading level of The Ginn Reading Program (1985), while the 17 other students in the class were being instructed on the second grade level. In other second grade subject areas, these three students

were expected to perform on grade level even though their reading skills were below grade level.

In February, the students began a program of remediation in reading. The Ginn Reading Program (1985), for the second grade level was used. Consistent with brain compatible techniques, the three remedial students received reading instruction that allowed for freedom of movement, encouraged talking and sharing of ideas, permitted students choices in the ways in which they participated or completed an activity based on their preferred learning modality, provided opportunities for the students to reinforce skills through multisensory hands-on experiences, and emphasized activities and projects that related to reality rather than contrived assignments that required completion of workbooks and worksheets. The students were in a setting that provided use of computers, examples of work by other students, an assortment of reading materials including books, magazines, newspapers, and reading games, and interaction with many people including other students, teachers, staff members, and parents. Immediate feedback was provided to the students to encourage mastery of material rather than emphasis on the number of correct/incorrect responses in seatwork. Finally, the students were evaluated on the material they mastered and not graded on right and wrong answers completed in a workbook. This allowed the students to function in a

setting that reduced the threat of failure and encouraged risk taking in their own learning in a safe and secure environment. The unit and level tests of The Ginn Reading Program (1985) were used with the students. When the students mastered the skills of the unit, as judged by the remedial teacher, the test for that unit was administered to the students.

Conclusions

In the five months of remedial reading instruction using brain compatible techniques, the three students were able to reach grade level in reading as measured by The Ginn Reading Program (1985). In studying the test results of each student, it is evident that there was progress. Lisa's total test scores (Figure 5, p. 68) show consistent growth with an average score of 95%. Lisa's greatest improvement was in decoding (Figure 4, p. 67). Kevin's scores reflect improvement in vocabulary (Figure 6, p. 69), comprehension (Figure 7, p. 70), and decoding (Figure 8, p. 71). Of the three students, Kevin's tests scores show the greatest progress. Jessica's scores indicate inconsistencies in her progress, but her total test scores (Figure 13, p. 79), with the exception of her Level 7 test, reveal overall higher scores as a result of brain compatible instruction.

This study reveals Kevin profitted greatly from instruction with brain compatible techniques as evidenced in his test scores. Lisa also showed great improvement in her

reading scores, especially in the area of decoding. Although Jessica continued to show inconsistencies in her achievement, there was some improvement in her reading scores, and it can be concluded that she benefitted from brain compatible instruction. Therefore, the hypothesis that the use of brain compatible techniques used for remediation would be effective instruction for all three members of the remedial group is supported by the results of this case study. The test results indicate that the three students successfully completed the second grade levels for The Ginn Reading Program (1985), and also indicated that the students overall performance improved based on the reading tests.

The results of this study indicate that the use of brain compatible instruction for the three students involved in this study was effective. Lisa, Kevin, and Jessica were able to reach grade level in reading as a result of using brain compatible instruction in the remedial reading program. The program of instruction provided for the individual needs of the students. The three students were able to identify ways in which they learned best and were given the opportunities to use their preferred learning style. The instruction helped to create a disposition for learning in which the students gained enjoyment and satisfaction from the effort involved in the learning process as well as from the mastery achieved.

The three students were able to achieve the skills and objectives of the Ginn basal reader for the second grade level. The students passed the unit and level tests of the program. They were able to read the stories and practice the skills for the level. The three students showed progress throughout the program and were able to achieve grade level by the end of the five month remediation program. Therefore, the hypothesis that the three members of the remedial reading group would achieve the skills and objectives of the Ginn basal reading series when taught with brain compatible techniques is supported by these results.

This study also revealed that it is possible to use brain compatible techniques in conjunction with The Ginn Reading Program (1985). Some adaptation of the basal reading series was required but brain compatible techniques made it possible to utilize the Ginn series. These results reveal that teachers do not have to follow exactly the teacher guide outlines of the basal reading programs that account for 75 percent to 95 percent of what goes on in reading classrooms throughout the country (Anderson, Heibert, Scott, and Wilkinson, 1985). Teachers using brain compatible techniques can adapt the basal reading series to provide effective reading instruction.

There is evidence that Lisa, Kevin, and Jessica were able to apply the skills of the remediation program to other subject areas where brain compatible instruction was not

used. The end of the year examination in Langauge Arts indicated that the students applied the skills they learned. Lisa scored 83%, Kevin scored 93%, and Jessica scored 87% in the exam, well within the range of their classmates' scores of 81% to 100%.

The students applied their skills in friendly letters they wrote, stories they composed, books they chose to read. Although the application of these skills cannot be measured by test grades, it was obvious that the students not only had achieved the skills, but they also had the disposition to use them. These results support previously conducted research that reveals that strong emotions that are associated with learning have a greater chance of remaining in the long term memory. When the brain is challenged to apply the skills learned, excitement, interest, and attention result (Whyte, 1989).

Not all skills learned in the brain compatible classroom, however, were transferrable. The non-threatening environment created in the brain compatible classroom was not able to be carried back to the regular classroom setting. Kevin was most affected by this fear.

The students still had difficulty completing the many written tasks from workbooks and worksheets required by the classroom teacher. In the regular classroom setting, this excessive emphasis on skilled performance, that is, the ability to remember the teacher expected answer was

perceived by the three students as threatening. Not only were the exercises creating negative dispositions toward reading, but recent research indicates that workbook exercises rarely require or encourage the development of comprehension (Bennett, 1988), and worksheets that provide limited feedback from the teacher create conditions to reinforce errors (Winograd and Smith, 1987).

The non-talk classroom setting was diffficult especially for Lisa and Kevin. The limited group interaction and lack of mobility were challenges the three students faced on a daily basis as they returned to the regular classroom.

In summary, the return to the regular classroom setting after instruction in the brain compatible classroom was difficult for the three students. Although there are indications that the students were able to apply to other subject areas the reading skills taught in the brain compatible classroom, the environment of the brain compatible classroom that fosters the desire to learn was not as easy to apply in the classroom where brain compatible techniques were not used.

The knowledge and skills acquired by Lisa, Kevin, and Jessica during the five months of remediation are measurable by their test scores. Their dispositions or attitudes toward reading are more difficult to measure.

These three students had acquired the skills they needed for success in reading, but of greater importance, they had the disposition to use these skills. The application of skills to real life situations gave the students reason to use the newly acquired skills.

The students also exhibited a disposition of interest in what they were doing. They gradually showed more persistence in their activities and projects and the intrinsic reward for these tasks was the enjoyment of sharing the results of the projects with their classmates.

It became evident that the students were gradually setting their own learning goals and the development of the dispositions of effort and mastery were observed. When the students became comfortable in the non-threatening environment of the brain compatible classroom, they became less concerned about the possibility of failure and attempted more challenging activities and projects. They were less reluctant to show their lack of understanding and readily asked for assistance when they needed it. The non-competitive setting created a learning situation in which they worked together to apply what they had learned to new problems and situations. The students showed enjoyment and satisfaction from the effort involved in the learning process as well as from mastery of the material they had achieved. The results of this study supported the hypothesis that brain compatible techniques used for

remediation strengthened the dispositions of interest, effort, and mastery toward reading in the three members of the remedial group. These findings also support the results of prior research (Glasser, 1986), (Katz, 1988), (Kovalik, 1986) conducted to determine the effectiveness of developing in students desirable dispositions toward learning.

Recommendations

As these three students begin third grade, they will be on grade level with their 17 classmates. The brain compatible techniques were profitable for these three students in the reading remediation program, but an entire program of instruction designed with these techniques is recommended for the continued success of these students.

"Our schools...are not ineffective because they do not know what happens at synapses or the chemistry of neurotransmitters, but rather because they have yet to address the brain as the organ for learning, and to fit instruction and environment to the 'shape' of the brain as it is now increasingly well understood" (Hart, 1983, p. xiv). In order to fit instruction and environment to the "shape" of the brain, educators must be willing to create a a brain compatible classroom in which students talk and learn how to communicate well, feedback is evident in every area of the curriculum, and students are encouraged to take risks in their learning and are therefore freed from the threat of failure.

Learning depends not only on what helps, but also on eliminating or reducing the factors that hurt (Hart, 1983). Because the brain is recognized as the organ for learning, instruction must be organized in such a way that the brain can function naturally. The classroom must be an environment that provides the opportunities for the brain to function in a natural way. It is recommended that teachers and administrators study the brain as the organ for learning and apply this knowledge by creating brain compatible environments for learning.

The classroom must be a place that encourages natural curiosity. Students must be free to take risks in their own learning. It is recommended that teachers encourage students to take risks in their learning. Students need the freedom to try new approaches in problem solving, to experiment with alternate methods of learning such as cooperative learning groups or studying with partners, to relate their classroom learning to their everyday life through letter writing, guest speakers, penpals, or taking political action in local issues. This built-in urge to take chances, to dare, to seek excitement and new events is a natural function of the brain. When students are constantly told what to do and how to do it through textbooks, workbooks, lecturing, and oral presentations, the tendency of the student is to respond to the orders given. The fear of failure increases and the student operates in an

environment that stifles creativity. A relaxed and secure environment that encourages natural curiosity enhances learning.

Learning experiences must be pleasurable and deal with information that is new, different, or unexpected. The learning must have goals. The objectives of the experiences must be perceived by the learner as useful, or the experiences must touch the creative or emotional realm in order to facilitate learning. Repetitive tasks, worksheets, and drills do not create an experience for the brain that will produce learning in any reliable way (Hart, 1978). It is recommended that teachers evaluate the materials and methods they are using for instruction, and replace these with learning experiences that are creative, useful, or create an emotional bridge for the learner (Kovalik, 1986).

Talking is important for the development of the whole brain. Students must talk and communicate to learn. In the classroom setting, students need to talk about what they are doing, to discuss with their classmates new ideas, to hear from others feedback on their own ideas. Workbooks and silent seatwork do not provide this necessary communication within the classroom. It is recommended that teachers encourage and provide for two-way communication in the classroom by allowing students to speak with each other in small group discussions and activities, ask questions for

guidance and information, engage in public speaking, write memos, reports, requests, and suggestions.

"The core of natural learning is the desire to better understand how the world operates (Hart, 1983). The learner seeks information that is useful and meaningful to the learner. Curriculum must be designed to facilitate learning that will be useful to the student. Integration of real life situations with textbook information will provide an environment in which world discovery will occur for students.

Robert Gagne (cited by Hart, 1983, p. 152), has stated that "the essential task of the teacher is to arrange the conditions of the learners' environment so that the process of learning will be activated, supported, enhanced, and maintained." The teacher must be the facilitator in the classroom. The teacher must provide the opportunities for the students to learn through their preferred learning style. In order to understand students' learning styles, it is recommended that teachers identify their own learning styles. Because teachers often instruct students according to the teacher's learning style, it is necessary for teachers to develop lesson plans that will provide multi-sensory experiences so that all students will benefit.

Scheduling in the learning environment must be flexible. When student interest in activities of learning is obvious, it is recommended that the teacher adjust the

time limits to benefit the student, and not necessarily to accomodate a schedule. The dispositon of interest in an activity may be threatened by frequent interruptions.

Teachers are the role models for the development and encouragement of desirable learning dispositons in students. Children will learn dispositions from observation and imitation of models (Katz, 1988). Teachers strengthen dispositions such as interest, curiosity, mastery and effort by acknowledging and appreciating students' development of these dispositions. It is recommended that teachers provide opportunities for students to act out their interest or curiosity. The goals teachers set for the activities they provide for students must communicate challenge and encouragement. Statements such as, "Today I want to see how much you can learn about pets", "Let's experiment with a different kind of writing today", invite students to accept the challenges of learning. Promising rewards of high grades or gold stars may create conditions that undermine the intrinsic reward of the student who is interested in learning. Students' dispositions toward involvement and interest will be strengthened when they are encouraged by teachers who provide them with opportunities to engage in projects that require effort and involvement.

In order to provide students with useful feedback, it is recommended that the testing process be given careful consideration. If teachers use standardized testing, or

tests that accompany textbooks, it is suggested that the teacher study the test before administering it to the student. As revealed in this study, the test does not always measure what has been taught. The response given by a student may not be the same response given in the answer key, and further investigation may reveal that more than one response is correct. Students need the opportunity to explain answers on a test, and teachers have to be flexible enough to accept reasonable responses from students.

Tests should be used to measure the mastery of the material learned, and not used as a measurement for failure. It is recommended that teachers administer tests at the time they feel students have mastered the material. Students do not learn from giving wrong answers.

The more tests are emphasized, the more teaching prepares students to give the teacher-expected answer on the test. It is recommended that tests include problems that are closely related to real life situations. Tests that involve remembering the right answers given by the teacher, or tests that provide right answers by merely checking a multiple choice question do not allow the student to apply the knowledge learned. When there is an excessive emphasis on skilled performance as measured by standardized testing, inaccurate results may label a student as at-risk of failure.

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